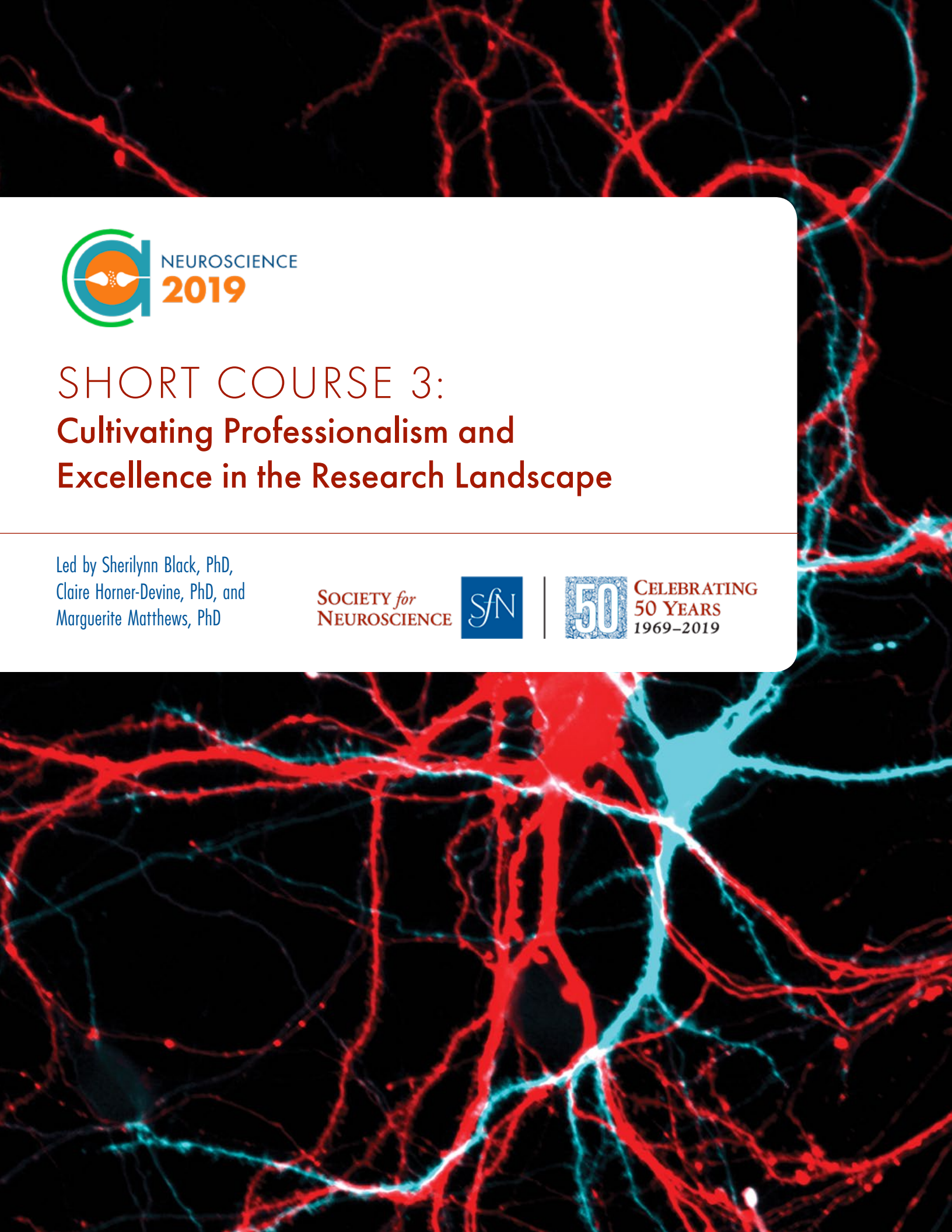

NEUROSCIENCE 2019

SHORT COURSE 3:

Cultivating Professionalism and Excellence in the Research Landscape

Led by Sherilynn Black, PhD, Claire Horner-Devine, PhD, and Marguerite Matthews, PhD

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Short Course 3

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NEUROSCIENCE 2019

SHORT COURSE 3

Cultivating Professionalism and Excellence in the Research Landscape

Faculty: Sherilynn Black, PhD, Claire Horner-Devine, PhD, and Marguerite Matthews, PhD

Friday, October 18 • 1–5:30 p.m. • Location: McCormick Place • Room: S106

TIME	TOPIC	SPEAKER
12:30–1 p.m. • CHECK-IN		
1–1:10 p.m.	Opening Remarks	Marguerite Matthews, PhD, National Institute for Neurological Disorders and Stroke
1:10–2:10 p.m.	Setting a Framework: Introducing Professionalism and Excellence in the Research Landscape	Sherilynn Black, PhD, Duke University
2:10–2:20 p.m. • BREAK		
2:20–3:40 p.m.	Defining Your Experience: Developing Professionalism and Excellence in Your Current Environment	Claire Horner-Devine, PhD, Counterspace Consulting; University of Washington
3:40–3:50 p.m. • BREAK		
3:50–5:10 p.m.	Taking It Forward: Applying Professionalism and Excellence Throughout Your Career	All faculty
5:10–5:30 p.m.	Q&A/Final Thoughts	All faculty

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Introduction

Successful training in academic research and career development relies heavily on the ability of all members of the research community to demonstrate professionalism and maintain productive collaborative relationships. A significant part of achieving this professional excellence is dependent largely on an institution's commitment to diversity, equity, and inclusion of all students, trainees, and faculty, especially those who belong to underrepresented groups. During this short course, attendees will explore how early career neuroscientists can navigate different aspects of the research landscape, including circumstances resulting from power dynamics, structural inequities, and different forms of bias. Participants will engage in a series of interactive exercises focused on cultural awareness and a multiple-mentors framework. The course is designed with senior graduate students and postdoctoral fellows in mind, with a goal of empowering trainees as they successfully progress through their research careers.

Should Professionalism Be a Priority During Academic Training?

Sherilynn Black, PhD

Office of the Provost
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Introduction

What counts as a successful academic training experience? Many would immediately look to tangible measures, such as the number of publications or fellowships received, and indeed, these are usually very important factors for graduate students and postdoctoral scholars as they go out into the market to pursue a wide range of careers. However, successful training should also include elements of professional behaviors that enhance a student or postdoc's potential to thrive in an array of professional environments. As career options continue to broaden and diversify in creativity and scope, it is important for students and postdocs to be trained multidimensionally so that they can contribute to professional environments beyond providing discipline-specific knowledge and/or technical skills. It is also important that they demonstrate tenets of professionalism, which directly impact the climate of training environments and influence every aspect of the training experience.

Shaping the Climate of Training Spaces

A trainee's abilities to effectively work with peers, communicate clearly, treat others with respect, foster a positive work environment, and demonstrate leadership are important skills to develop during his or her years of training and development. The ways that individuals interact with one another are important in shaping the tone and overall climate of training spaces, and this is directly linked to who is able to progress toward a chosen career and who is unable to accomplish desired career goals. The climate that students and postdocs experience will deeply affect their ideas about professionalism and is an important determinant of how they will engage with the training environment they currently inhabit and will possibly lead in their future careers.

Recently, issues of climate have been directly connected to professional conduct, as evidenced by published reports on graduate education and harassment in academia by the National Academies of Science, Engineering, and Medicine (NASEM, 2018a,b). These reports raise very important questions about the training models used in graduate education and the climate in which students and postdocs work to pursue their educational goals. These reports have amplified ongoing national conversations around the types of unacceptable behaviors that have historically occurred in training environments as well as existing efforts to build training experiences that are fully inclusive and provide equal opportunities for success. Together, these dialogues highlight how to best promote excellence, civility, and professionalism in academic spaces. Faculty and institutional leaders play a critical role in setting the tone of training environments, and they must consistently model professional conduct and work to correct unacceptable behaviors. Students and postdocs also play an important role in this discourse. As future scholars, intellectual influencers, mentors, leaders, and policy makers, students and postdocs are poised to have a significant impact on defining the climate of training spaces and shaping new codes of professional conduct.

The recent NASEM reports make it increasingly clear that a productive, equitable, inclusive, and respectful climate is, in fact, at the heart of a successful training experience. Decoupling these qualities from the ability to innovate and achieve the highest levels of academic excellence misses the important opportunity to explore how the natural combination of these features improves outcomes across the board. For students and postdocs who are deciding about the career they would like to pursue and the professional life they want to experience in the future, exploring their own experiences with professionalism can be considered in a number of ways.

Professionalism as a scholar

- Is your work consistently held to the highest, most intellectually rigorous standards?
- Is each aspect of your work conducted in an ethical and transparent manner?
- Was care taken to design hypotheses and research questions, develop theories, interpret data, and evaluate scholarly products objectively and without bias?
- Do you see each item through to completion and keep your work moving forward when your research plan isn't productive or faces challenges?
- Do you contribute to the intellectual discourse in your discipline in an open and civil manner?

Professionalism as an academic colleague

- How well do you interact with others?
- Do you successfully collaborate with your peers and advisors, value their ideas, and treat them with respect?
- Are you a dependable and reliable collaborator, and do you hold yourself accountable to follow through with tasks and deadlines?

- Do you challenge yourself to thoughtfully consider the opinions of your peers who have different ideas, backgrounds, and educational experiences?
- Do you properly attribute the work and efforts of others?
- Do you communicate your expectations clearly and provide feedback effectively?
- Are you adaptable and receptive to feedback?

Professionalism as a citizen of your institution

- Do you consider how your working style, attitude, and behavior affects others?
- Do you place value on mentoring and teaching?
- Do you contribute to the training environment in a positive way and promote the stated goals and values of your institution?
- Do you support your peers and colleagues and encourage their success?
- Do you help foster a respectful and inclusive environment for research and mentoring?

Professionalism as a future leader

- Do you work to lead in the current professional space that you occupy?
- Do you consider how your current attitudes and behaviors affect your ability to accomplish future goals and professional opportunities?
- Do you engage and network in a variety of environments and establish regular and meaningful interactions with different types of people?
- Do you have mentors, and do you mentor others?
- Do you thoughtfully, respectfully, and calmly engage with others in the midst of a challenge or crisis?
- Do you strive to be fair in all of your interactions with others?

Final Thoughts

As students and postdocs expand their ideas of possible future careers and consider how their values may align with the existing academic cultures and training structures, conversations around professional conduct will continue to emerge as deeply important factors that shape what constitutes a successful training experience. When tenets of professionalism are fully embraced as critical aspects of successful student and postdoc training experiences, the entire workforce will benefit from an elevated discourse, an improved climate, and a more equitable experience for all.

Sherilynn Black, PhD, is the Associate Vice Provost for Faculty Advancement and an Assistant Professor of the Practice of Medical Education at Duke University.

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An End to the Search for the Perfect Mentor

Claire Horner-Devine, PhD

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The Myth of the Guru Mentor

One individual cannot provide all the mentoring support that another individual desires or needs. Let's repeat that: No one person can serve as a sufficient mentor to meet a postdoctoral scholar's every mentoring desire or need (Horner-Devine et al., 2018a). In fact, there is no "single guru mentor" for anyone (Rockquemore, 2010). An important role that postdoctoral supervisors and postdoctoral office (PDO) staff and faculty can play in the career development of their postdocs is to provide a framework for mentoring. This can empower postdocs to develop their own mentoring network comprised of multiple mentors (Rockquemore, 2014).

This is especially important for postdocs who belong to systematically marginalized social identity groups (including but not limited to women, people of color, and individuals with disabilities) (Horner-Devine et al., 2018b). These postdocs are navigating an academic environment that was not built with them in mind and often have less access to informal networks, a relatively high sense of isolation, and exacerbated feelings of loneliness, which are common in academia (Keogh, 2019). In what follows, we outline five important steps that postdoctoral supervisors and PDO staff and faculty can take to support their postdocs in getting the mentoring they need to thrive in their careers.

Center Mentoring Needs and Desires on the Mentee

Step 1: Help postdocs understand that they should put an end to their search for a guru mentor and instead develop a mentoring network.

A network made up of multiple mentors can serve postdocs well as they navigate the transition from graduate school to independent researcher and professional. Rather than creating a mentoring network based on the availability of particular potential mentors, an effective network should be centered on the mentees and the kind of mentoring they want and need to excel in their careers (Horner-Devine et al., 2018a).

Step 2: Engage postdocs in conversations around identifying their mentoring needs and desires.

Ask "What do you want or need to thrive and be successful?" Don't tell—ask. Asking is a way to communicate your respect for all that they know about themselves and their careers and to empower them to take charge of their career development. These conversations can be effective in one-on-one formats as well as through personal reflection and small group discussions. Some common mentoring needs include professional development, sponsorship, intellectual community, and access to opportunities, among others (Fig. 1). Additional needs might include emotional support, accountability, role

Figure 1. What do you want or need to thrive and be successful? Common mentoring desires and needs are shown, with room for more. Each person will have a different set of mentoring desires. Adapted from Rockquemore KA. Copyright 2019, Counterspace Consulting.

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modeling, honest feedback on ideas and writing, or access to a "third space" (a place that is outside home, the first space, and work, the second space, where people gather and interact) (O'Meara, 2019).

An important role that postdoctoral supervisors and PDO staff and faculty can play in the career development of their postdocs is to provide a framework for mentoring and empower postdocs to develop their own mentoring network comprised of multiple mentors (Rockquemore, 2014). This counterspace, where you can be fully yourself—living and expressing your professional and social identities at the same time without question—can be especially important to postdocs from systematically marginalized groups. Based on critical race theory (Solorzano et al., 2000), counterspaces are supportive, identity-affirming community spaces in which individuals belonging to systematically marginalized groups have their experiences and skills validated. Counterspaces can provide opportunities, as Macy Wilson has described (Wilson, 2017), for women of color to talk "about how to survive and thrive in predominantly white and male spaces." A recent study (Yang et al., 2019) found that women have different networking needs than men and that women with a tight female-dominated inner circle had a job placement level 2.5 times higher than those with a male-dominated inner circle. This close circle of women gave them access to "gender-specific private information and support." While this study did not address race and ethnicity, it is possible to hypothesize a similar relationship between social support and job placement for women of color.

Identify and Develop a Mentoring Network

Once postdocs have identified their mentoring need and desires, they are ready to identify their current and potential mentors.

Step 3: Collaborate with postdocs to identify anyone in their lives who is already serving as a mentor, discuss which mentoring needs and desires are being met, and strategically assess who else they might add to their network to provide them with the broadest level of support.

Ask "What is a strategic and intentional way to get the support you want?" Mentors can be located within a postdoc's current institution as well as at other institutions or even outside of their field. And just as there is no single "guru mentor," there is no set model for who can be an effective mentor. Although some mentoring needs can be met through relatively traditional hierarchical relationships or by more senior colleagues (e.g., role models, sponsors, and advocates), peer mentoring can be an important node in a mentoring network. Peers and near-peers can meet important mentoring needs including accountability, writing support, and problem solving. Friends and family can also serve as mentors who offer emotional and social support as well as accountability.

Make It Happen

Step 4: Step into conversations with postdocs about how to initiate, develop, and sustain a rich variety of mentoring relationships.

Although not all postdocs already know how to develop strong mentoring relationships, all can benefit from discussing how to be strategic and intentional about initiating new relationships and nurturing existing relationships. Many, if not most, mentoring relationships do not develop formally, as in, "Will you be my mentor?" (Mobley, n.d.) However, when mentoring relationships develop organically, that development can still be strategic and intentional. For example, Kerry Ann Rockquemore from the National Center for Faculty Development and Diversity writes about how to maximize conversations about mentoring and strongly suggests avoiding using the word "mentoring" or asking someone outright to be your mentor (Rockquemore, 2015). A great step for those seeking mentorship is to dig into resources about what defines a good mentoring relationship and learn how others have benefited from a wide range of such relationships.

Keep It Going

Step 5. Remind postdocs (kindly) that the need for multiple mentors never ends and that relationships change.

As they navigate their careers, postdocs should periodically revisit their mentoring needs and desires and network regularly. A PDO can institutionalize such mentoring network checks through workshops, one-on-one conversations, and articles about the importance of keeping up mentoring relationships and networks.

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Self-Care Through Intentional Community

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Earlier this year, I gave a presentation on mental health, cultural competence, and services for African-American/black folks at the Cultural Impact Conference (Wilson, 2019). This particular conference was one in which multiple cultures were highlighted, and special attention was given to the ways that mental health impacts these groups. It was an inspiration to see so many people collectively dedicated to the advancement of mental health for marginalized communities.

Unfortunately, however, such crucial conversations are more of an exception than a rule, and they are often missing from our personal experiences as scholars of color, particularly when navigating academia. That missing link contributes to fostering a highly polarizing atmosphere for academics of color. It is important to recognize the value of community when navigating these experiences, as the presence of community can often be a form of self-preservation, rejuvenation, and comfort.

Lately, much attention has been paid to self-care and the ways in which we practice it (or fail to do so). I firmly believe that, as a woman of color, having conversations about what it means to survive and thrive in predominantly white spaces is integral to my self-care and self-preservation. In order to embrace this aspect of self-care, though, I have learned that I need to be intentional about the people with whom I spend my time, the mentors I seek out, and the opportunities of which I partake outside school (that is, the communities I form or with which I engage). This is sometimes a difficult balance to achieve as a graduate student because time is a luxury.

Throughout all my years of higher education, I have simultaneously worked while taking a full course load. This is a common experience for many college students, but the demands of graduate school add an extra layer of difficulty to the mix. Integrating the totality of one's identity can also be a difficult task when many spaces are not fully welcoming of those identities—or are "conditionally accepting" at best (Grollman, 2016). The importance of community during such times cannot be understated. Whether it's having a fellow graduate student take detailed notes in your absence, someone lending a listening ear when you are feeling stressed, or having someone with whom to celebrate the good times, I occasionally find myself relying on the help of others in spite of my "strong black woman" complex (Stringer, 2014).

One thing I didn't realize until the final years of my program was how crucial it was to communicate with, and seek advice from, mentors and scholars of color. Upon beginning my program, I quickly developed a feeling of resentment because it seemed as though fellow students and many faculty members were not as invested in (read: vocal about) cultural competence and the myriad ways in which mental health must be tailored to suit the needs of complex individuals. All of this discomfort was compounded by the Eurocentricity of our readings. During those times, I felt as though parts of my identity were being dismissed, and I subsequently executed poor self-care strategies by isolating even further. I internalized the notion that I was a complex individual and that others would not understand or care to hear about my grievances.

In keeping quiet, however, I did myself a disservice because no one understands how to correct a problem that is never verbalized. Further, I prevented myself from making meaningful connections by not voicing my concerns to the scholars of color who had already paved the way and probably experienced similar feelings along their journeys. Had I done that from the beginning, I believe that my approach to self-care would have improved rapidly and that I could have made meaningful connections even sooner with scholars of color whom I greatly admired.

This is not to say that all scholars of color will automatically take us under their proverbial wings and happily share their own stories. Nevertheless, speaking with scholars of color at my institution and in the community (even if it wasn't directly about how I was feeling) helped to create a safe space in the midst of an experience that sometimes felt unwelcoming or silencing. Hearing some of the frustrations from their time in graduate school was encouraging and liberating because I realized that I wasn't alone.

That understanding was especially helpful because it made me feel visible and heard. That visibility was (and continues to be) empowering, and it has encouraged me to be more intentional about expanding my chosen community. One small thing I've prided myself on over the years is remembering and using people's names. This practice goes a long way, probably because it recognizes one's individuality among an abundance of generalities. Not only does it make the person with whom you are speaking feel

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good, but it increases the likelihood that he or she will remember you.

That will definitely come in handy when you need some help down the road. In hindsight, I've realized that many of the scholars of color to whom I reached out were beyond happy to share their experiences with me, and part of that enthusiasm may have resulted from knowing what it is like to be glossed over, ignored, rejected, or just not taken as seriously in predominantly white academic spaces.

Standing out positively in academe is important but sometimes difficult, and it can be easy to slip into the comfort of anonymity by just doing your work and graduating, or in some cases, quitting altogether. As an introvert, I loathed conversations about "networking" because I assumed that meant small talk, but I slowly learned that it doesn't have to! One-on-one conversations with individuals can be as meaningful as you choose to make them, and a big part of that depends on how much you are willing to share of your authentic self. That is easier said than done, however, because it takes courage to make oneself vulnerable and willing to humbly learn from another.

Scholars of color know well that we must work at least twice as hard to be considered half as good as our white counterparts, and that this work is augmented by our other identities that may further marginalize us within predominantly white spaces and institutions. Attempting to compensate for paying the "black tax" and other penalties—economic, social, and emotional—for being a minority can be exhausting. The work that we have chosen to do is important, and it is imperative that we take care of ourselves while staying the course: we owe it to ourselves.

Looking forward, other people will be able to stand on our shoulders as they journey to improve academe and the broader world in which we live, all because we were proactive and not reactive. Additionally, we can be a lighthouse for those behind us because we stayed true to ourselves in the midst of the isolation and attempts to silence us—because we were committed to our own self-preservation. In the words of Audre Lorde, "If I didn't define myself for myself, I would be crunched into other people's fantasies for me and eaten alive." Lorde, and many like her, reclaimed their time in efforts to practice effective self-care, and it will be a boon for us to integrate these same efforts into our personal and work lives.

The academy and future scholars need our voices now more than ever. Speaking out, writing, and intentionally connecting with others will enable us to survive and thrive within these spaces, because this work cannot be done alone.

Macy Wilson is a doctoral student of clinical psychology currently completing her internship with the Federal Bureau of Prisons. She identifies as a biracial (African-American and Xicana [indigenous Mexican-American]), queer, cisgender woman. Wilson's research integrates issues of masculinity, womanist and feminist issues, and culturally competent, proactive intervention.

Acknowledgments

This chapter was adapted with permission from Dr. Wilson's article for *Inside Higher Ed*: Self-care through intentional community, December 8, 2017. Available at https://www.insidehighered.com/advice/2017/12/08/importance-minority-scholars-being-intentional-about-building-community-opinion.

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Career Advice for Underrepresented Academics

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Six years ago, I wrote *The Black Academic's Guide to Winning Tenure—Without Losing Your Soul* with Tracey Laszloffy (Rockquemore and Laszloffy, 2008) because I wanted to give something to new faculty members. It was everything I wish someone had told me when I started out in my academic career. Since then, I created the National Center for Faculty Development and Diversity to open up mentoring to a larger group of academics. To make this work even more transparent, I'll be writing a "Dear Kerry Ann" column for *Inside Higher Ed* so that you can get your burning questions answered.

To kick off this series, I'll start with the single most common question I receive: What advice do you have for underrepresented faculty starting out on the tenure track?

There is a peculiar reality to being the only fill-in-the-blank in your department. And the same can be true if you are one of only a few such individuals in a large department. It means that you will have all the pressures to meet your university's expectations for research, teaching, and service that everyone on the tenure track experiences; at the same time, you will have some unique obstacles and structural challenges that emerge from racism, sexism, classism, and other prejudice. That said, let me offer a few suggestions.

Be Highly Productive

First and foremost, your ability to get a tenure-track job, win tenure, and preserve options for mobility will be defined by your scholarly productivity. That means that early in your career, you will want to clarify which habits and skills you need to develop for extraordinary productivity. Those include developing a daily writing practice, strategically planning your semester, aligning your time with your evaluation criteria, learning when and how to say "no," overcoming perfectionism, and managing the inevitable rejections that come with academic writing.

Let's be clear: I'm not suggesting that you work all the time. Achieving work–life balance is possible, but it doesn't just happen by itself. If you want to be highly productive and have a life off campus, you'll need to become a master of time management. Specifically, you will have to recognize that there is a structural challenge in faculty life in which the activities that matter the least to your success on the tenure track have the greatest built-in accountability, whereas the things that matter the most have very little. In other words, teaching and service will make seemingly urgent demands on you every day. And as an underrepresented faculty member, you will inevitably receive a disproportionately high number of service requests. Your research and writing, however, operate on a different time frame, and they have a long-term logic. You will therefore have to create accountability structures that rival the demands of students and colleagues to make sure that your work gets done and that you still get to have some fun.

Forget the Guru—Build a Network

The mentoring model common among graduate education is the guru-advisor model. However, to be successful as a faculty member, you need to throw that idea out the window. Instead, start thinking about what a fully supportive network would look like for you. Typically, assistant professors need some combination of professional development, emotional support, intellectual community, safe space, role models, sponsorship, access to opportunities, and substantive feedback. One person cannot meet all these needs for you, so stop asking "Who will be my mentor?" and start asking "What do I need, and who is the best person to help me get that need met?" This will keep you from overrelying on any one person and help you to start building a thriving network of mentors, sponsors, and collaborators.

Your Money or Your Life

Possibly the single best advice I received was to start managing my personal finances in such a way that I could always choose to leave a position. That sounded like a wildly impossible idea when I was living on a graduate stipend and had nothing but student loan debt. But someone gave me a great little book, *Your Money or Your Life* (Robin and Dominguez, 1992), which enabled me to develop sound financial practices and make decisions that were oriented to financial health instead of shackling myself to unnecessary commitments. Although it may seem like a personal issue, financial well-being has a powerful way of keeping you focused on possibilities instead of feeling trapped.

Racism Exists and You Have to Succeed Anyway

One thing you can count on as a minority faculty member is that in addition to the general stressors of faculty life, you will experience various forms of racism and/or sexism on campus. This will most frequently occur in the form of daily microaggressions. As such, it's important not only to master the skills of healthy conflict but also to create explicit and intentional daily practices for stress management and validation.

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Personally, I experience microaggressions on a daily basis. Yes it sucks, and I wish I lived in a world where this didn't occur. But knowing that they're a part of my daily reality means identifying what I need to build into my schedule so that these daily invalidations don't penetrate my inner peace. That requires me to have lots of low-level, healthy conflicts every day. It also means that I need to walk outside, laugh, and connect with people who love, respect, and validate me daily. I also have a punching bag that I hit every day to discharge residual frustration and anger. You may develop different practices, but the key is to figure out (1) how to manage microaggressions in the moment, (2) how to discharge any residual bad feelings from your body so they don't build up over time, and (3) how to be reminded regularly of what truly matters.

It's a Job, Not Your Life

Sometimes faculty members get confused and imagine that their career *is* their life. This is dangerous because it not only makes your existence one-dimensional but it also doesn't lead to optimal productivity, creativity, or innovation. When you are underrepresented, overwork can be toxic and can lead to a sense of self-worth that is predicated on factors that are outside your control (such as whether you win tenure). It is critical to your health and well-being that you cultivate a full life off campus, that you have friends who are *not* academics, that you connect to communities that sustain you, that you socialize with people who are creating positive change in the world, that you reproduce if and when you choose, and that you realize that the academy is one (but not the only) venue in which to do work you love.

I hope this general advice is a helpful starting point, but we would love to get into the nitty-gritty of faculty life by answering specific questions from you. So please let us know what questions you have about academic life by tweeting us @NCFDD.

Acknowledgments

This chapter was adapted with permission from Dr. Rockquemore's first column for *Inside Higher Ed*: Introducing a new column, November 19, 2014. Available at https://www.insidehighered.com/advice/2014/11/19/introduction-new-career-advice-column-minority-academics.

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The BRAINS Program: Transforming Career Development to Advance Diversity and Equity in Neuroscience

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In order to better prepare trainees and advance diversity in neuroscience, career development must move beyond scientific skills. The BRAINS Program's continuous professional development model positively impacts participants' careers by fostering a sense of community and creating a counterspace for critical conversations.

Career Development: Moving Beyond Scientific Skills

Many have eloquently advocated for embracing diversity in biomedical science and broadening the participation of individuals from underrepresented groups (URGs) (e.g., the Fall 2016 special issue of *CBE Life Sciences Education*). Indeed, efforts to foster diversity in neuroscience have been ongoing for decades (Nishi et al., 2016). Even so, the percentage of neuroscience graduate students from racially and ethnically underrepresented minorities is low ($\leq$12%) (Sved, 2013). According to the National Science Foundation's Survey of Earned Doctorates (2001 through 2013), of 10,000 neuroscience PhDs earned by US citizens and permanent residents, only about 8.5% were awarded to persons from URGs (NCSES and NSF, 2015). While there are no definitive data on the number of neuroscientists with disabilities and their career paths, of the 96,345 PhDs awarded from 2003 to 2012 in the biological sciences or psychology (common fields for neuroscientists), only 2% (2,102 degrees) were awarded to persons with disabilities (NSF and NCSES, 2014). At the next career stage, less than 5 percent of the postdoctoral scholars and tenure-track faculty in neuroscience are members of URGs (Sved, 2013).

Efforts to increase diversity in science must not only focus on exposure to science and acquisition of research and scientific skills; they must also address broader professional development topics. After all, successful scientists need much more than scientific skills and expertise to thrive in their careers. Communication, time management, strategic planning, networking—these professional and career development skills are part of the large suite of tools and experiences that individuals need to successfully navigate their scientific careers. Unfortunately, much of professional development in the scientific domain is offered ad hoc and often as an a la carte menu, resulting in periodic and isolated professional development experiences that are accessed by only a subset of researchers. In addition, there is currently little in the way of professional development training on how to navigate the social and cultural landscape that is embedded within the science community. This type of training is particularly relevant to individuals from URGs, who often lack access to the informal networks where scientific and career-cultural information is exchanged. We posit that the scientific enterprise, writ large, will benefit greatly from more strategic, integrative, intentional, and continuous professional development training at all career stages. To advance equity and diversity in the biomedical sciences, we must do better to prepare all scholars, particularly those from historically underrepresented groups, with a holistic suite of professional development skills that focus on retaining talented scientists in the field.

We have taken this approach with a professional development program aimed at neuroscientists called BRAINS: Broadening the Representation of Academic Investigators in NeuroScience. BRAINS is an NIH-NINDS-funded national program that seeks to support the success of early-career, post-PhD neuroscientists from URGs, specifically racial and ethnic minorities and persons with disabilities (www.BRAINS.washington.edu). Founded in 2011, BRAINS is a cohort-based program that offers ongoing, community-centric professional development and fosters conversations specific to the experiences of people from URGs in neuroscience. BRAINS participants are post-docs, researchers, and assistant professors. A total of 59 early-career neuroscientists have participated in two BRAINS cohorts to date, with over twice that many likely to participate over the next five years.

Factors Impacting Success: Lessons from Social Science Research

So, what works when it comes to professional development interventions, particularly when targeting individuals from URGs? Social science research has identified a suite of factors related to career success for individuals from groups underrepresented in STEM (see Williams

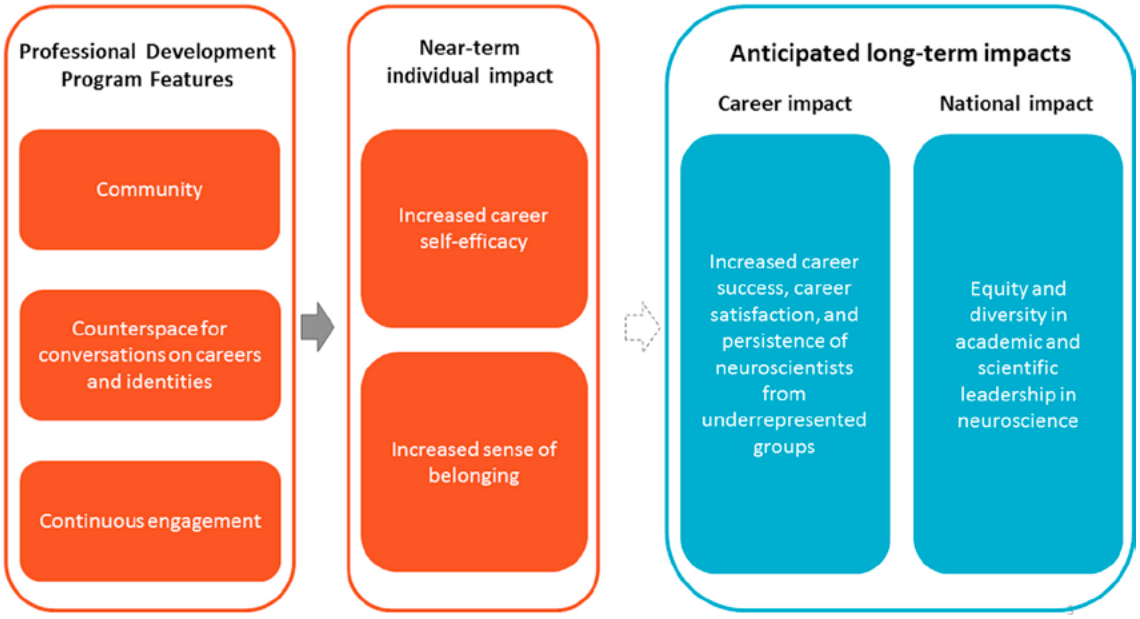

Figure 1. Three Key Recommended Features for Professional Development Interventions and the Near-Term and Anticipated Long-Term Impacts

et al., 2016 and Pfund et al., 2016 for an overview). Programs that are intentionally designed to address these factors have the potential to increase the probability of success for individuals as they navigate their scientific careers. Here we highlight two of these factors: self-efficacy and sense of belonging.

Self-efficacy (Bandura, 1977) refers to an individual's belief in their ability to successfully perform particular tasks to produce a specific outcome. Increases in self-efficacy are related to increases in motivation and a range of performance measures, and self-efficacy is an important mediator of commitment to science by persons from URGs (Chemers et al., 2011). For example, an individual with high self-efficacy has a higher probability of both trying and successfully performing a set of skills than does an individual with the same skills but lower self-efficacy. We focus on self-efficacy because individuals develop their sense of self-efficacy from personal performance, learning by example, social interactions, and how they feel in a situation.

In addition to self-efficacy, sense of belonging (the subjective sense of affiliation with the scientific community) is an important mediator of an individual's persistence in scientific careers for scholars from URGs (Chemers et al., 2011; Estrada-Hollenbeck et al., 2011). Sense of belonging to a scientific domain, such as neuroscience, involves feeling accepted and valued by members of one's academic community (Good et al., 2012). For example, sense of belonging metrics might ask about the extent to which an individual feels like part of the family in the field or the extent to which an individual identifies with the field or profession (Goodenow, 1993).

Putting Theory into Practice: Three Strategies from the BRAINS Program

We have applied our understanding of the relevant social science research to inform the BRAINS Program. Moreover, we have learned a lot from our BRAINS program participants about what works to support the careers of early-career investigators from groups that are underrepresented in neuroscience. Perhaps the biggest take-home finding to date is that professional development content best serves scientists from URGs when offered within a community, so that individuals both expand their career skills and feel empowered in their careers. This strategy directly builds on the social science research insights previously mentioned. We have documented some of the impacts and outcomes of the BRAINS program elsewhere (Margherio et al., 2016). Here we focus not on specific outcomes but rather on what we know about why BRAINS is working and how the neuroscience community might use this perspective to think about professional development more broadly. In particular, we share three specific insights that are important to transformative career development training (see Figure 1).

First, professional development cultivated in a community context helps develop levels of trust that allow individuals to seek feedback about their new skills and increase their engagement with resources and relationships developed during a professional development program (Horner-Devine et al., 2016; Nishi et al., 2016). For BRAINS, community is developed in several ways. Our 4-day symposium is held on an island outside of Seattle. The retreat-like atmosphere allows participants and senior panelists to get away from daily distractions and deeply connect with each other on a variety of topics through panels, small group work, individual reflection time, skills practice, and communal meals. The community ties are also strengthened by intentionally engaging in conversations that address both personal and professional topics and identities. These conversations offer opportunities to resonate

with a wide variety of stories and experiences, such that everyone is able to see a bit of themselves in each other. Moreover, hearing the broader context in which advice, tips, and tools are given allows individuals to better determine what might work for them given their own particular context and emboldens them to actually implement their new skills and tools. Beyond what happens at the symposium, the BRAINS program explicitly nurtures the community connections through three primary mechanisms: 1) early-career peer mentoring groups that are established after the symposium, 2) a BRAINS community listserv that sees regular traffic long after a symposium has concluded, and 3) a reunion and booth at the Society for Neuroscience conference. Each of these community "touches" are an opportunity to renew connections, encourage accountability, solicit feedback and advice, and reduce doubts about the ability to embrace and implement the new skills. As noted by a participant in the program's annual evaluation survey, "It was very encouraging to become a part of the BRAINS community because it is a far more supportive environment. I think having access to a supportive community like BRAINS makes it easier to branch out in the larger neuroscience community, as one has a 'homebase' that can help sort out difficulties in the more aggressive neuroscience arenas."

Second, community connection combined with confidentiality and a shared social identity among participants (i.e., career stage, race, ethnicity, ability status, gender, etc.) sets the stage for establishing "counterspaces" for meaningful conversations about topics that may feel taboo, but are incredibly relevant to professional development and career success. A counterspace is a space and opportunity that promotes positive self-concepts among individuals from URGs; it invites each person to combine their social identities with their professional science identity without question and to participate as their whole selves (Solorzano, 1998; Case and Hunter, 2012; Johnson et al., 2011). The BRAINS program's counterspace supports explicit discussions about how one's experience in science is influenced by one's gender, racial or ethnic identity, ability status, and other historically and socially significant identities. These conversations are often "the elephant in the room." When tips and tools are suggested without acknowledgment of how issues like identity impact individuals' experiences, they can fall flat, go untapped, or even feel like an extra burden. Creating a space to have authentic conversations about careers, professional development, and life allows professional development tips and tools to be taken in context and then applied in real life. Indeed, BRAINS participants have said that BRAINS "[p]rovided a safe space in which to network and ask tough questions." and offered "a safe environment to speak my mind without the fear of being judged." The BRAINS models creates these spaces and raises these conversations through the use of storytelling and cross-career perspective sharing. Senior panelists are encouraged to be as open as possible in sharing their career and life stories. Their openness invites participants to be open and authentic about their concerns and questions. When one member of the community puts themselves out there, others soon follow. Indeed, we have seen both panelists and participants being more vulnerable and open as the symposium progresses, the trust level increases, and the community connection strengthens.

Finally, professional development must be viewed as continuous rather than as a one-off topical workshop. When individuals are exposed to any new skill or are trying to improve an existing skill, they need time to process what they have learned and a chance to practice applying the new skill. This holds true for professional development skills such as time management and communication skills, since those skills must also be incorporated into an existing context of experiences and perspectives. The BRAINS Program is specifically designed to address professional development within the context of personal experiences and to provide continuous opportunities to engage in the material learned through the program. The continuous element is critical in allowing each participant to adapt new skills into their individual context in an ongoing manner, and it leverages the impact of the strong community connections as well as the conversations that stem from the counterspace created at BRAINS. The BRAINS peer mentoring circles, which launch after the multi-day symposium, are explicitly designed as mechanisms for participants to continue their connection to the BRAINS community, set personal goals, discuss professional concerns, and receive constructive feedback. This ongoing professional development space allows participants to revisit strategies, tips, and tools from their symposium experience as they face particular and often new challenges or decisions in their day to day life. Such continuous engagement increases the "stickiness" of the tips and tools introduced at the symposium and thus allows content to be woven throughout participants' careers rather than remaining isolated to a workshop. Continuous engagement also provides opportunities for relationships and trust to deepen among community members. Participants re-engage with professional development as it becomes relevant to their own experience. In this way, they apply the tips and tools to new challenges with the support of a strong community.

In summary, our experience has demonstrated that, when professional development is offered in a continuous fashion and grounded in community and relationships through a counterspace, participants' self-efficacy and outcome expectations change, allowing them to better pursue their careers with confidence, clarity, and satisfaction. The experiences help individuals apply new tips, tools, and skills so that they work for them, in their context. Moreover, participants have a community on which to lean that offers support, encourages accountability, and celebrates their contributions and accomplishments. By creating counterspaces to address professional development while actively acknowledging the impact of the personal (whether it be race, gender, ability status, parental status, or something else) on the professional, we can increase the uptake of new and improved skills, build trust and community, and help scientists, particularly those from URGs, thrive in their careers.

Recommendations: Things to Try in Your Own Contexts

How can you put these three ideas into practice? Community, continuous

Table 1. Sample Professional Development Topics to Explore at an Institutional or Individual Laboratory Level

Sample Topics	Description	Sample Resources
Moving from time management to life management	Move from thinking about what is urgent and how to get more done to thinking about what is important and how to have the most positive impact with what you do	Steven Covey's *First Things First* and *The 7 Habits of Highly Effective People* Robert Boice's *Advice for New Faculty Members*
Thriving when you are one of a few	Examine how to create community and relationships that encourage discussions and acknowledgement about social identities at work	Kerry Ann Rockquemore's and Tracey Laszloffy's *The Black Academic's Guide to Winning Tenure—Without Losing your Soul*
Getting the mentoring you need to succeed	Explore the importance of developing a mentoring network with relationships beyond the traditional junior-senior relationship	Ellen Daniell's *Every Other Thursday: Stories and Strategies from Successful Women Scientists*
Understanding leadership and work styles	Understand our own leadership styles and the styles of those with whom we work and manage to improve communication, relationships, and productivity	Christopher Loving's *Loving Leadership: Rekindling the Human Spirit in Business, Relationships, and Life*

engagement, and counterspaces for conversations about social identities require trust—trust among participants and also between participants and their facilitators, community members, and institutions. In June 2015, Professor Claude Steele spoke to the National Academy of Sciences (NAS) Committee on Women in Science, Engineering, and Medicine (http://sites.nationalacademies.org/PGA/cwsem/PGA_167298) and highlighted that "the first thing that has to happen is trust" in diverse settings and communities in order to lay the groundwork for people to believe in their abilities and their future in science. He posits that the scientific enterprise must make people from underrepresented backgrounds feel "like people are interested in them and pulling for them, and that people believe in their ability." A 2016 New York Times article (Colón Ramos and Quiñones-Hinojosa, 2016) calls for a similar effort, specifically with regard to the field of neuroscience. How do you create a culture in your scientific community where trust is central? This is a critical issue to resolve, for it opens up the possibility of developing the community, ongoing engagement, and conversations about social identities.

In neuroscience research, one of the most effective strategies for solving complex problems is to take a multilevel and integrative systems approach. This approach has been fundamental to the success of BRAINS. With this in mind, to increase and retain diversity in the neuroscience workforce, we similarly suggest a multipronged approach that includes system-wide and individual laboratory components. At a broad systems level, a sense of community and trust can become institutionalized if leadership embraces the view that having a more diverse workforce is a very effective mechanism for growing excellence rather than a duty or mandate to meet some type of numerical goal. With this view, diversity and inclusiveness do not compete for resources at the expense of excellence; rather, they serve as facilitators of resources and excellence. Entire organizations can then develop policies, procedures, and practices that are geared toward enhancing community and trust among all, but especially URG personnel. An example of such a practice could be institutional support for the formation and continuation of groups that bring young scientists from URGs together with a smaller number of more senior scientists who have experience and/or interest in diversity-related issues. If needed, these groups can draw from different departments—for example, including other types of science departments—in order to generate a critical mass of graduate students, postdoctoral students, or early-career faculty. These early-career groups are noted here because they represent the career stage associated with the largest attrition of diverse scientists. A goal of such groups might be to share experiences, challenges, and solutions that have worked for others. Embedded in these counterspace discussions is professional development skills training that assists URG scientists in navigating science research and teaching careers. Table 1 offers several professional development topics and related resources that we address in the BRAINS program. These community groups should be encouraged to continue with regular meetings and/or the development of peer mentoring circles, since continuous engagement and "touches" with discussions of identity and career are essential to retain URG members in science.

What can be done on the scale of individual laboratories? This is a critical issue, as the laboratory environment is the immediate home for an individual. If you have never discussed personal challenges to science careers in your laboratory group meetings, the thought of doing so may seem daunting. However, as a good scientist, you might take the view that you have to experiment and consult with the relevant literature or experts in the field to learn what is known about potential questions of interest. Then you can start small by essentially running a pilot study within your own laboratory group to explore these questions or topics.

What type of specific question might you pose for your pilot study? Some suggestions include the following: What is one thing you can do to build a sense of community in your laboratory? Or, how can you encourage and inform lab members to learn more about how our individual backgrounds affect experiences in science careers, particularly if one is a member of an URG? You can also solicit feedback from your trainees to learn more about the type of professional training they need and then follow up on those needs by paying particular attention

to how professional training might be made more effective after considering an individual's personal needs. Don't stop at your first attempt to create community, build trust, and/or offer ongoing professional development. Figure out what did not work and why, then try something different at the next lab meeting. Don't just rely on your own assessment of how things went. Ask your trainees. That exchange helps to build community, especially if you have trainees from diverse backgrounds. Each of these interactions is an opportunity to increase trust and conversation in your community. Eventually, you may even find yourself or others raising topics that previously seemed taboo. Sharing relevant research articles about particular career concerns is a good entry into a conversation. Being honest about what you do and do not know and being open to learning together also builds trust. Creating a space to catalyze conversations about careers and identities takes time, but it is a worthy investment.

It will take time, but collectively we can create institutional and individual laboratory cultures that cultivate a sense of community, offer opportunities for continuous professional development, and engage trainees not only in terms of their scientific identities but also in terms of the other identities that contribute to their total experience in science. In doing so, we can shift the professional development culture toward one that more intentionally addresses the training gaps experienced by early-career scientists, particularly those from URGs. All scientists will be well served by this shift, as we will collectively create and retain a stronger and more diverse scientific workforce. Ultimately, diversity, inclusion, and equity can and should be internalized by the entire neuroscience community rather than simply endorsed.

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Mapping a Mentoring Roadmap and Developing a Supportive Network for Strategic Career Advancement

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Abstract

This article presents a proactive, individual-centered mentoring model which meets a recognized need for defined, practical methods for supporting comprehensive career planning and strategic development grounded in personal career aspirations. The developed model consists of a mentoring roadmap charting process and construction of a developmental mentoring network based on an integrative literature review of successful mentoring practices and adaptation of tested methods for retrospective analyses of effective mentoring. The mentoring roadmap concept encompasses the following steps: (a) self-reflection, (b) establishment of mentor–mentee relationship(s), (c) maintenance of mentoring relationships, and (d) advancing in mentoring relationship(s). To support strategic advancement along a defined mentoring roadmap and toward attainment of individual goals, the identification and cultivation of a broad collection of mentoring resources or mentors (i.e., nodes) and the relationships (i.e., edges) which connect these nodes in an effective mentoring network topology are discussed. The mentoring roadmap and network model is proposed as complementary to top-down or formal organizational mentoring interventions and as effective for short- and long-term career development planning as a self-guided assessment or mentor-engaged tool to support individuals seeking mentoring.

Keywords

career development, mentor network mapping, mentoring, mentoring network, mentoring roadmap, professional development

Introduction

Mentoring has been widely recognized as one of the key factors contributing to skills development, psychosocial or socio-emotional support, and career advancement and success (Haggard, Dougherty, Turban, & Wilbanks, 2011; Jacobi, 1991; Kram, 1985; Packard, 2016). As such, effective mentoring can contribute to increased self-efficacy and effectiveness (Kram, 1985) and improved and expanded skills and competencies (Jacobi, 1991), which can support individual advancement, including in educational and career domains. In the context of careers, mentoring is often viewed from a top-down or hierarchical perspective in which a senior individual or organization-sponsored mentor provides information needed for an individual to recognize and achieve defined milestones required for success in a specific context (Redmond, 1990). In this regard, top-down mentoring serves effectively to socialize individuals to organizational norms during pursuit of success (Ensher, Thomas, & Murphy, 2001). Recently, however, there has been an increasing appreciation that mentoring centered in the needs and personal aspirations of individuals can empower individuals toward personally-defined career advancement (Rockquemore, 2013). Such individual-centered mentoring is best served by developing a network of mentors (Higgins & Kram, 2001; Rockquemore, 2013; Sorcinelli & Yun, 2007). Notably, both forms of mentoring contribute to success, with top-down mentoring having greater implications for short-term career outcomes and individually-driven, network-based mentoring having been shown to support long-term career goals, advancement, and retention (Higgins & Thomas, 2001).

Despite a general recognition of the importance of mentoring, there is a dearth of established, evidence-based tools for guiding individuals in determining their personal mentoring needs and/or establishing effective mentoring networks to support their aspirations and professional growth in an individual-centered mentoring framework. Herein, a review of mentoring literature is engaged to support the development of an individual-centered mentoring model for guiding

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comprehensive career planning and strategic development based on personal career aspirations. The developed mentoring roadmap and network model includes an individual mentoring roadmap tool based on mapping self-identified needs and career goals. The mapping process includes an assessment of a personal need for mentoring to support successful advancement along a career roadmap. The process and benefits of mapping a personal mentoring network to support comprehensive career planning and progress along a defined trajectory are delineated. To facilitate development of a suitable support network, a mentoring network mapping tool is presented. The network construction model is based primarily on adapting tested methods used to evaluate qualitative data from interviews or surveys related to retrospective analyses of success in individual careers (Long et al., 2013) and a scholarship of integration approach (Boyer, 1990) to incorporate knowledge derived from effective mentoring (e.g., Haggard et al., 2011) and developmental mentoring models (Kram, 1985; Megginson, Clutterback, Garvey, Stokes, & Garrett-Harris, 2006; Washington & Cox, 2016). This mentoring network tool is useful by mentees for self-assessment or as a planning or progress assessment tool in mentoring relationships. Rather than a focus on "retrospective sensemaking" about mentoring (Higgins & Thomas, 2001, p. 230), this approach meets a recognized need for defined practices to support cultivating multiple developmental relationships or a mentoring network to support long-term career advancement (Higgins & Thomas, 2001). The described roadmap charting and network construction tools enable proactive sense-building regarding personal mentoring needs and the supportive mentoring networks needed to support specific individuals. A review of relevant literature is provided throughout the text to present the theoretical underpinning and to support the development and use of the mentoring roadmaps and networks model.

Mentoring and Mentors Defined

What Is a Mentor?

There are myriad definitions of mentor available (Haggard et al., 2011). These definitions often engage the concept of a senior or experienced individual who provides advice and guidance to a novice, or individual with limited experience, in a particular domain. Mentoring in this top-down framework then emerges as interactions, largely based on a one-way flow of information, between a mentor and an individual being mentored (i.e., a mentee). The focus of the mentoring can include a range of goals, including skills or competency development, psychosocial or socioemotional support, and career development (Haggard et al., 2011; Jacobi, 1991; Kram, 1985). Alternative forms of mentoring, including peer mentoring (Driscoll, Parkes, Tilley-Lubbs, Brill, & Pitts Bannister, 2009; Eby, 1997; Kroll, 2016) and group mentoring (Eby, 1997; Kroll, 2016; Montgomery, Dodson, & Johnson, 2014; Varkey et al., 2012), also serve as effective means to realize these goals. Some of these alternative models move toward bidirectional engagement of mentor and mentee, which has been shown to improve mentoring outcomes in many cases (Sorcinelli & Yun, 2009). Bilateral engagement is particularly important as such exchanges promote adapting mentoring to individual mentee goals and needs. Thus, a working concept, or functional approach, to conceptualizing mentors and mentoring begins to emerge, which is distinguished here from advising or more classically defined top-down hierarchical mentoring (Yun & Sorcinelli, 2009), both of which are typically designed to facilitate progress by advisees or mentees toward organizationally defined goals.

Mentors versus advisors. Advisors tell any individual what steps or activities are needed to complete a task, degree, or attain tenure or promotion (Baker & Griffin, 2010; Montgomery et al., 2014; Ramirez, 2012). In this regard, advising is instruction or guidance that would benefit *any* student pursuing a particular educational course or *any* individual on a particular career path. Advising, then, centers on providing factual information about the particular activities that must occur to complete an educational course of study or actions pertinent to any individual pursuing a particular career or goal-directed trajectory (Montgomery et al., 2014). Advising, though necessary and highly desirable in many cases, is largely a one-way transfer of information from advisor to advisee in pursuit of an organizationally specific context of success. In this sense, many forms of top-down "mentoring" can appear to more aptly fit a role of advising of individuals toward organizational norms or institutionally driven goals for individual workers and their contextual success.

By contrast, mentoring is positioned as a distinct and deeper engagement that is based on a thorough personal understanding of one's mentee and that individual's personal career aspirations. Mentoring very frequently includes some advising, yet transcends advising in its provision of individual-specific information and bilateral engagement and interactions that include the offering of advice based on a deep personal understanding of the mentee's cadre of prior experiences, strengths and weaknesses, personal aspirations, values, and professional goals (Montgomery et al., 2014). The investment of a mentor in getting to know the personal strengths and weaknesses of an individual—"learning" the person (Montgomery, 2015a)—allows the mentor to address an individual's unique needs in the mentoring relationship (Baker & Griffin, 2010; Kirchmeyer, 2005; Montgomery et al., 2014; Ramirez, 2012). This learning includes gaining an understanding of the individual's strengths and weaknesses to the degree that a mentor can suggest and help guide the mentee along a path of action that engages and capitalizes on the mentee's strengths, while providing opportunities to improve recognized weaknesses for the benefit of personal growth and successful attainment of educational and/or career goals. Effective mentoring may, and perhaps *should*,

also engage personal values of the mentee and mentor. Such a values-based focus provides an opportunity for personalized mentoring with a goal of promoting improved outcomes for individual mentees, yet also addresses the recognition that differing values can lead to conflicts or differences in expectations that can impede or derail mentoring exchanges. Thus, impactful mentoring focuses deeply on personal growth as one recognizes and considers the whole person, and also seeks to support an individual's values-based personal advancement in a specific domain (Montgomery, 2015b). This individual-centered view of mentoring is distinct from many top-down approaches, which again can very often reflect an advising perspective associated with specific and often time-delimited goals related to instrumental facets of career success (Lewis & Olshansky, 2016), and in fact often meet the needs of a smaller part of one's comprehensive and career-long mentoring needs.

Lifeline of Mentoring

The attainment of comprehensive mentoring to support an individual's mentoring needs is a process. It is a process, however, that has identifiable elements that comprise stations along a lifeline of mentoring. A specific individual's mentoring lifeline is based on particular goals or milestones paired with the individual mentoring capital required for achievement of personal career aspirations. An individual mentee has many needs at any one station or along the trajectory of the mentoring lifeline and to successfully traverse the lifeline requires a complex and comprehensive set of mentoring resources and expertise.

Multiple roles versus multiple mentors? Mentors can fill many roles, including the provision of practical advice about careers or a course of study, contributions to professional development, or dissemination of political guidance and strategies (Montgomery et al., 2014). In all of these engagements, there is a need for mentors who understand an individual's personal commitments, values, and future goals to provide the most efficacious mentoring. To support complex mentoring needs, people often seek a comprehensive mentor. However, the wide range of areas to which mentors can make contributions suggests that mentors either have to serve effectively in multiple roles or alternatively that mentees need to engage multiple mentors, each with specific strengths and/or expertise, to gain the comprehensive mentoring needed. Thus, the focus of mentoring should shift to the goal of assembling comprehensive mentoring, which may—and perhaps *should*—include input from multiple mentors rather than seeking a single individual to fill multiple roles as a comprehensive "guru" mentor (Chesler & Chesler, 2002; de Janasz & Sullivan, 2004; Ensher et al., 2001; Grant, 2015; Long et al., 2014; Long et al., 2013; R. McGee, Lee, Pfund, & Branchaw, 2015; Packard, 2016; Packard, Kim, Sicley, & Piontkowski, 2009; Rockquemore, 2013; Sorcinelli & Yun, 2007; Wilson et al., 2012; Zambrana et al., 2015). There are many formats for gaining access to comprehensive mentoring, including collective mentoring by a group of preassembled individuals (Blue, 2001; Chesler & Chesler, 2002; Davidson & Foster-Johnson, 2001; Dodson, Montgomery, & Brown, 2009; Eby, 1997; R. McGee, Saran, & Krulwich, 2012; Montgomery et al., 2014; Smith, Cech, Metz, Huntoon, & Moyer, 2014), as well as the alternative of assembling a personal collection of mentors into a mentor network that is strategically constructed to serve the comprehensive needs of any particular mentee (Hetty van Emmerik, 2004; Higgins & Kram, 2001; Long et al., 2013; Sorcinelli & Yun, 2007; Trube & VanDerveer, 2015; Zambrana et al., 2015). Based on longitudinal analyses of mentoring relationships, the engagement of mentoring networks has been associated with long-term career outcomes, whereas top-down approaches more effectively support short-term career goals (Higgins & Thomas, 2001). Despite the recognized value of mentoring networks for supporting long-term career outcomes, practical mechanisms for enacting the building of individual mentoring networks to complement the provision of an organizational mentor are limited. Based on theoretical frameworks introduced in the literature, a model for mapping an individual mentoring roadmap is introduced and followed with a description of the building and sustaining of mentoring networks that support comprehensive career planning and strategic development for individuals. The roadmap charting and network construction processes include both descriptions of specific mentoring types and resources (i.e., nodes of the mentoring network) and the mentoring relationships that connect the individual mentee with identified resources (i.e., edges in the network).

Constructing a Mentoring Roadmap

An individual's mentoring roadmap draws on the lifeline of mentoring concept that consists of identifiable stations along a planned career trajectory. The mapping out of these stations is based on the consideration of driving questions and the path from one station to the next comprises what is referred to as the drafting or charting of a complete mentoring roadmap. Despite its simplified depiction (Figure 1), the mentoring roadmap is intended as nonlinear. The path starts with, and returns frequently to, self-reflection which is absolutely critical as a starting point in the individual-centered mentoring model as a means to identify individual mentoring needs based on self-defined career goals. From self-reflection, the roadmap progresses to the establishment and maintenance of mentoring relationships, and then proceeds to considerations of advancing in mentoring relationships as progress with career development or other goals are achieved. Ultimately, the "moving ahead" portion of the roadmap includes consideration of renegotiating and/or ending mentoring relationships, as needed (Figure 1). Such mentoring roadmaps have immense potential for supporting both short-term and long-term personal

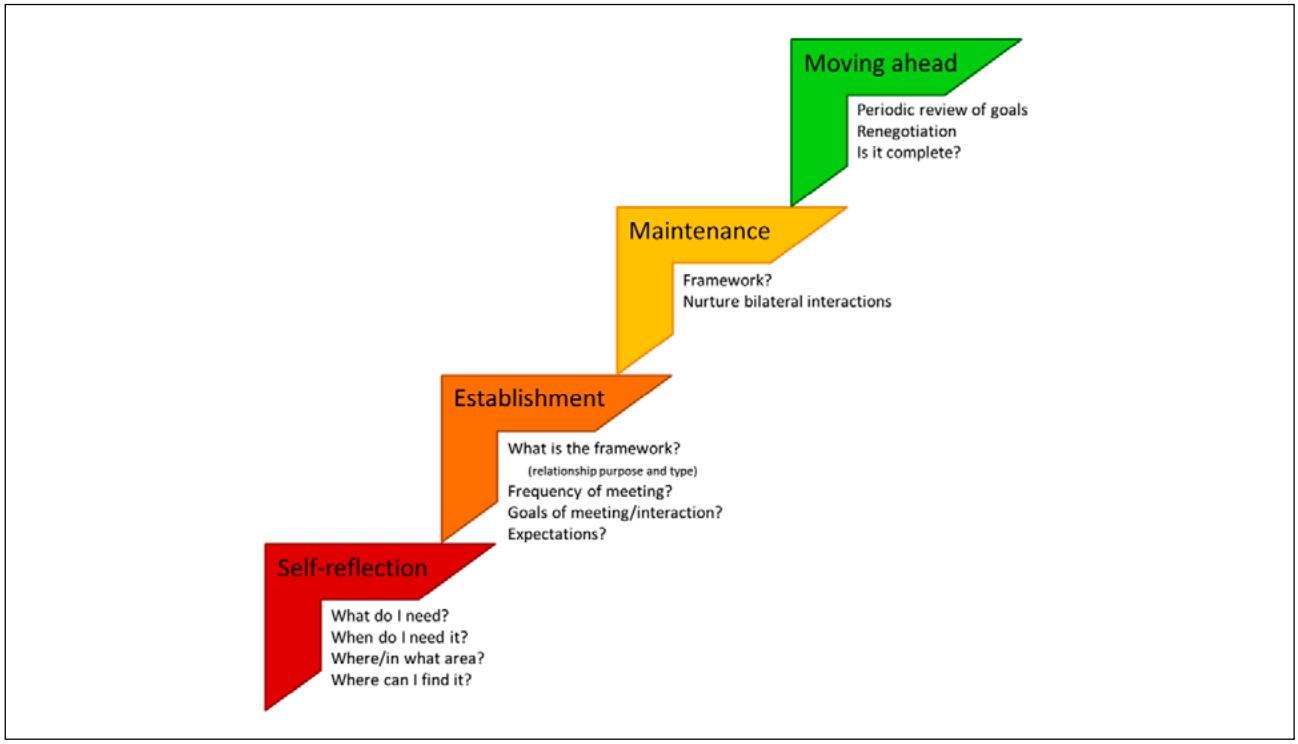

Figure 1. Elements of a mentoring roadmap.
Note. This figure illustrates the stages or stations included in a mentoring roadmap, including self-reflection, establishment, maintenance, and moving ahead. Pertinent guiding questions or considerations for each stage are represented below each major area. Although depicted in a linear progression, the roadmap is not unidirectional and revisiting steps such as self-reflection should occur periodically.

envisioning regarding one's individual mentoring needs, or the recognition of mentoring needs and provision of mentoring capital from the perspective of the mentor when used as planning or progress assessment tool. The process of composing a personalized roadmap using driving questions and based on insights from the mentoring literature is described.

Self-Reflection

What do I need and why do I need it? Self-reflection is a start pointing for individuals to identify mentoring needs related to their personal aspirations. Without a clear understanding of what support is specifically needed to attain self-defined goals or in what specific areas support and mentoring are needed, how can an individual adequately identify the right source(s) or mentors for obtaining what is needed? A role for self-reflection or self-assessment in identifying professional mentoring needs or goals and suggested tools and professional development opportunities for targeted self-assessment have been recommended (R. McGee, Lee, et al., 2015; Sorcinelli & Yun, 2009; Tull & Tull, 2012). Self-reflection is of key importance to facilitate robust self-awareness about one's individual strengths and weaknesses and to cultivate an ability to receive constructive criticism. These are critical factors in being able to effectively engage in and benefit from robust mentoring relationships. Some tools have emerged which are intended to facilitate strategic self-assessment, including versions of an individual development plan (IDP; Clifford, 2002; Vincent et al., 2015). The use of IDPs in particular has been supported as critical for promoting structured bilateral conversations between mentors and mentees (Faber, 2015; Vincent et al., 2015).

When do I need a resource? Having identified a core set of needs, another consideration is whether these are all needed simultaneously or whether resources can be engaged in specific phases. This is a critical consideration as it helps mentees identify when particular mentoring resources will need to be identified and engaged. This knowledge facilitates the prioritization of the search for mentor(s) and mentoring resources, which will serve as nodes in the building of a mentoring network (described below). This idea that not all resources are needed at once begins to draw on the idea that mentoring networks are dynamic in nature (Dobrow & Higgins, 2005). Attention to strategic management of the dynamics of one's access to mentor(s) and mentoring resources can support career success and advancement over time (Dobrow & Higgins, 2005; Uzzi & Dunlap, 2005).

Where or in what areas must the resource be located? The consideration of the identified areas of mentoring needs and whether these resources need ideally be local or can be

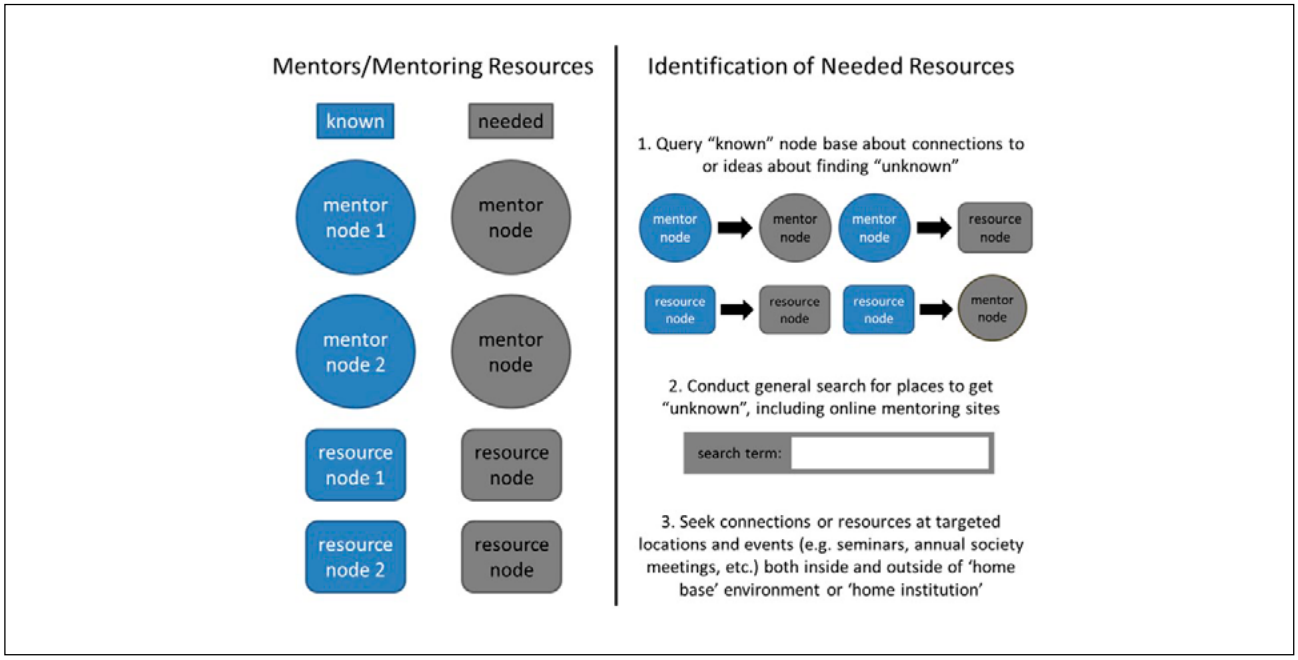

Figure 2. Identification of mentoring network resource nodes.
Note. Right, mentoring resources that serve as mentoring network nodes include known (shown in blue) and unknown or needed (shown in gray) resources. These nodes include human mentors (circles) and nonhuman resources (rectangles), examples of the latter include mentoring books, Internet resources, online courses, among others. Left, several ways to effectively identify needed resources are shown, which include querying known nodes to identify unknown mentors or resources, conducting information searches, or using engagement in target communities to connect with or identify nodes.

engaged from a distance is a vitally important one. Once specific needs are identified, the process of reviewing whether there are already individuals known to the mentee (i.e., known nodes; Figure 2) that can serve in a particular needed capacity can be engaged. If there are areas for which no resources are known, a specific plan for identifying these sources of mentoring can be formulated as discussed in detail below related to construction of mentoring networks (Figure 2). In addition, the availability of access to mentors or mentoring resources online is increasingly possible. Indeed, a growing number of electronic sources are available to aid in the identification of mentors or resources, the actual provision of mentoring that is needed, or to supplement information needed by the mentee in addition to heuristic knowledge needed locally (e.g., Blake-Beard, Bayne, Crosby, & Muller, 2011; Wadia-Fascetti & Leventman, 2000). Engagement of such mentoring resources can become a critical component of developing an individual plan for comprehensive mentoring.

Establishing and Maintaining Relationships

The initiation or establishment of mentoring relationships is the starting point for many classic and newer developmental mentoring models (Kram, 1985; Megginson et al., 2006; Washington & Cox, 2016). Whether directly following self-reflection as suggested here or as a first step, initiation begins with relationship building between mentee and mentors in the network. To truly facilitate the attainment of comprehensive mentoring to support personal aspirations, mentoring resources and mentor(s) must be identified and effective relationships must be established and maintained through specific means. To facilitate the use of the roadmapping model, evidence related to distinct purposes and types of mentoring relationships that support progress along a career trajectory are described.

What is the framework? The framework of mentoring relationships should be defined from both the point of view of the mentee and the mentor and overlap or connections between the two should be optimized. Particular points to be addressed in establishing a shared understanding about the framework of a mentoring exchange include the preferred mode of contact, frequency and format of meetings, goals of meetings or planned interactions, and expectations (Cunningham, 1993). It is vitally important to pay attention to the expectations and responsibilities of each party in the mentoring exchange (Grant, 2015; Washington & Cox, 2016) and to be clear *and* specific about the goals and expectations for both the mentee and mentor. Where possible, it is important to establish measurable outcomes associated with the defined goals and expectations. To enable the reaching of a joint consensus about expectations or to facilitate compromise where individual needs and expectations of the mentee and mentor diverge, it is critical to arrive at a common understanding of both the

purpose of the mentoring exchange (Megginson et al., 2006) and *type* of mentoring relationships that will emerge to support this purpose and to promote effective engagement.

Establishing purpose of the mentoring exchange. The purpose of mentoring relationships can take many distinct forms, including a goal of comprehensive mentoring, that is a more traditional type of mentoring that typically indicates that one's total mentoring needs are being addressed largely by one individual in a particular mentoring relationship; maintenance mentoring, which can help one navigate or maintain success in a current placement; transitional mentoring, which can be critical when moving from one career stage or placement to another; or, aspirational mentoring, which often positions individuals to move toward a career or opportunity to which they aspire.

Comprehensive mentoring. Comprehensive mentoring can fulfill the complete mentoring needs of different types, at different times, and/or for different individual weaknesses and/or strength-building opportunities (Anderson, Silet, & Fleming, 2012; Griffin & Toldson, 2012). Finding all that one mentee needs in a single source is very unlikely, and thus here the quest for *comprehensive mentoring*, rather than finding a *comprehensive mentor*, is supported. Comprehensive mentoring can be obtained through the building of a multidimensional network that engages many different mentoring types and relationships. As each individual mentee will have different mentoring needs, each individual's comprehensive mentoring network will be uniquely constructed and maintained.

Maintenance mentoring. Maintenance mentoring is more specific in being critical for supporting the advancement of individuals that have committed to a particular course of study or career placement—to keep one moving toward accomplishment of a specific goal that may be part of a larger ongoing trajectory. In this regard, maintenance mentoring can be a smaller more defined portion of a comprehensive mentoring exchange in some cases. Maintenance mentoring is most parallel to the stage of mentoring described as cultivation in Kram's (1985) developmental mentoring framework. This type of mentoring provides the support needed to maintain one's placement and to complete a particular, and often time-delimited, portion of one's larger career path. The needs vary at particular portions of an individual's path and thus the person who may serve as a valuable and effective maintenance mentor at one stage may not be the same individual needed to maintain one's placement and performance at distinct stages. The particulars of maintenance mentoring needed specifically at different stages of the academic path have been recently discussed (Montgomery et al., 2014).

Transitional mentoring. Transitional mentoring is critically important when an individual is moving from one career stage to another or from one type of environment to another. Such mentoring can be absolutely critical for initiating progress in a new role or position. It has been regularly recommended that special attention to the provision of mentoring during such transitions can support recruitment and retention of individuals broadly (Brown, 2011; Gibau et al., 2010; Malone & Barabino, 2009; E. O. McGee, Robinson, Bentley, & Houston, 2015; Stassun, Burger, & Lange, 2010; Stassun et al., 2011; Whittaker & Montgomery, 2012, 2014; Williams et al., 2011). Transitional mentors may be individuals with whom a mentee has a long-term association. Alternatively, this type of mentoring can very frequently be effectively accomplished through short-term transitional mentoring.

Aspirational mentoring. Aspirational mentoring can be based on mentoring needed for a future position or role to which one aspires, or based on future potential that an individual's mentor identifies or recommends. Aspirational mentoring is based on the concept of mentoring centered on gaining aspirational capital, defined by Yosso (2005) as one of six forms of cultural capital. Aspirational capital encompasses the ability of an individual to foster aspirations that appear to transcend what is possible based on the individual's current skill set, experiences, or station in life, or currently available resources (Yosso, 2005). In this regard, aspirational mentoring is comprised of the interactions with a mentor that facilitate mentees successfully, and hopefully strategically, navigating the gap between where they are currently and the role(s) and/or position(s) to which they aspire.

Defining the relevant type of mentoring exchange. In addition to having distinct purposes, the nature of mentoring relationships that are most appropriate for a particular goal, stage or progress along the roadmap can occur in many different types. Those distinct types discussed here and which can support specific mentoring purposes include formal versus informal, continuous versus episodic, and on-site versus offsite mentoring. Each of these relationship types and associated relevant literature is described in brief.

Formal versus informal. Formal mentors are often assigned to students, junior faculty, or employees based on their intake into a particular unit, department, or organization (Chao, Walz, & Gardner, 1992; Grant, 2015; Monroe, Ozyurt, Wrigley, & Alexander, 2008; Montgomery et al., 2014; Ragins & Cotton, 1999; Redmond, 1990; Wallace, Moore, & Curtis, 2014). These mentoring relationships are often dyadic and may or may not be based on identified personal factors or complementary characteristics of the mentee or mentor that could lead to a particularly productive, or alternatively avoid a nonproductive, exchange (Bass, Rutledge, Douglass, & Carter, 2007; Chao et al., 1992). By contrast, informal mentoring relationships can emerge through a senior mentor seeking out a more junior individual to offer support or guidance, or from an industrious or proactive mentee recognizing

the potential assistance or capital that may be available from an individual and the mentee initiating an engagement (Chao et al., 1992; Edmondson, 2012; Grant, 2015; Monroe et al., 2008; Ragins & Cotton, 1999). It is much more likely that informal mentoring relationships may be built based on personal factors, or perceptions thereof, that the mentee and/or mentor have that the relationship may be a "good fit." There has been much discussion that the need to seek out informal mentoring can be critical for women or racial/ethnic minorities who may be underrepresented in particular institutions, and thus where the formal connections may not engage factors particularly relevant or of concern to the mentee (Edmondson, 2012; Monroe et al., 2008; Wallace et al., 2014). Notably, such informal mentoring may largely be an "add-on" to mentees' established networks, including both formal and informal mentoring resources.

Continuous versus episodic. Continuous mentoring is the form that is often thought about as a default—a long-term relationship between a mentor and mentee. Continuous mentoring often occurs throughout a particular trajectory or the course of the mentee's career. Episodic mentoring is a frequent, if under recognized, mentoring type. Episodic mentoring centers around events or isolated moments that occur once or infrequently that result in a mentoring exchange, yet do not require long-term or ongoing engagement (Long et al., 2014; Long et al., 2013). Episodic mentoring is often an effective type used to fulfill the purpose of transitional mentoring needs.

On-site (local) versus off-site (distance). Finding effective mentors that are not in the same physical location is becoming increasingly plausible (Haggard et al., 2011). The use of such "offsite" mentors has been recognized as critical for providing underrepresented minority (URM)-specific mentors for URM faculty that have limited access to such mentors at their home institutions (Zambrana et al., 2015). Off-site mentors can be engaged in conversations at a distance through technology (Ensher, Heun, & Blanchard, 2003; Grant, 2015; Guerrero-Medina et al., 2013; R. McGee, Lee, et al., 2015; Packard, 2003; Whittaker, Montgomery, & Martinez Acosta, 2015), engaged via electronic platforms (Blake-Beard et al., 2011; Ensher et al., 2003; Guerrero-Medina et al., 2013; Long et al., 2014; Wadia-Fascetti & Leventman, 2000; Whittaker & Montgomery, 2014; Whittaker et al., 2015), or at locations such as annual meetings of joint disciplinary societies (Eby, 1997; Grant, 2015; Guerrero-Medina et al., 2013; R. McGee, Lee, et al., 2015). Online mentoring can serve as a critical part of an individual's mentoring networks; however, it has been strongly argued that off-site mentors should not replace or circumvent a need for local mentors at one's home institution or workplace as on-site mentors often have critical input into sharing heuristic knowledge needed for successfully navigating a particular place or work environment (Whittaker & Montgomery, 2014; Whittaker et al., 2015; Zambrana et al., 2015).

Bilateral interactions. Mentoring relationships of distinct types and to fulfill defined purposes are all bilateral engagements (Byars-Winston, Branchaw, Pfund, Leverett, & Newton, 2015; Grant, 2015; Greco, 2014; Montgomery et al., 2014). Although the benefits of mentoring for mentees are often highlighted in discussions of mentoring relationships, "mentorship is a bidirectional activity" (Pietro De Camilli in Yammine, 2015), with mentors also being enriched and gaining benefits from engaging with the mentee (Chesler & Chesler, 2002; Lechuga, 2011; McKinsey, 2016). Indeed, these relationships have been described as based on "mutual benefit and mutual responsibility" (R. McGee, Lee, et al., 2015, p. 23), as well as "truth and mutual trust" (Greco, 2014, p. 3252). In addition, the bilateral nature of mentoring relationships includes "reciprocity or mutuality of social exchange" (Long et al., 2013, p. 1). This is important in contributing to the strength (or distance) of connections between an individual mentee and mentors or mentoring resources (depicted as edges in topology of mentoring networks) (Uzzi & Dunlap, 2005). As the relationships have benefits to both engaged parties, it is critical to nurture productive bilateral interactions.

Moving Ahead: Renegotiating or Ending Mentoring Relationships

Periodic review of goals. As mentoring relationships develop, it is important for both mentee and mentor to occasionally reassess their continuing goals, and indeed need, for the exchange. It is important periodically to assess whether the framework and bilateral interactions established for maintaining a specific mentee–mentor relationship still work for both parties (Grant, 2015). Such an assessment may result in the realignment of goals and mentoring activities or the identification of new goals.

Reaffirmation or renegotiation. Occasionally, a review of a current mentoring exchange may result in the realization that a particular relationship is complete or no longer serves the needs of one of the involved parties. Even as a good mentor can help you creatively and critically think your way out of a bad "station" along your path, an ill-effective mentor can sink a good opportunity, or lead you astray. Such diversions from identifying and working toward goals represent a time, energy and motivation "sink," in which efforts are not moving the mentee forward in an individual career timeline. Periodic, intentional assessments of mentoring relationships allow recognition of whether a relationship is working well and should be reaffirmed, or whether a particular mentoring exchange has fulfilled its intended purpose or is no longer working well. This potential transition has been referred to as a "redefinition phase" in Kram's (1983) phases of mentoring relationships. In the event that a relationship needs to be significantly renegotiated or even concluded, negotiating the way forward requires attention to fully acknowledging the

valuable contributions that have been made. It is always advisable to make the transition out of the relationship gracefully and amicably (Grant, 2015).

Mapping Your Mentoring Network

Having established a roadmap for specific educational or careers goals, either short- or long-term, the task at hand is to engage a process that allows one to progress toward building, cultivating, and sustaining a developmental mentoring network that supports personal aspirations. To establish a supportive mentoring network, it is important to identify the specific mentoring resources (i.e., nodes) that will be included in a developmental network and to initiate the appropriate relationships (i.e., edges) that will be needed to support advancement.

What or Who Are the Key Nodes?

Based on an understanding of one's individual mentoring roadmap (Figure 1), the next steps are to move toward identifying the specific mentors and mentoring resources that will comprise the nodes in a developmental mentoring network needed to support individual progress along the crafted mentoring roadmap. Identifying the types of mentoring nodes needed to support individual goals is the first step (Figure 2). Once the types of nodes needed are identified, specific individuals or resources can be sought. It is likely that at least a portion of the needed nodes will already be known or available to the mentee; thus, the first sorting is of the identified types of nodes needed into known and unknown resources (Figure 2). The next step is to search for the remaining unknown nodes. One of the first sources of information that is likely to be helpful is to query known mentors about connections to identify unknown nodes. Additional sources include conducting general searches or seeking connections through venues such as meetings, seminars, and other places that individuals who possess the expertise that you seek may be found (Figure 2). The need for both personal and professional mentors has been recognized (Eby, 1997; Grant, 2015), and should be strongly considered in the building of one's network.

What Is Their Relationship to You?

Having identified relevant nodes, promoting an understanding or visualizing the quantity or nature of the nodes, as well as the edges or ties between these nodes, is the next stage in constructing a supportive mentoring network. The degree to which one has a diverse set of nodes in one's network has been described as "network diversity" (Dobrow & Higgins, 2005; Hetty van Emmerik, 2004; Uzzi & Dunlap, 2005). The degree to which these nodes originate from different contexts or social origins is referred to as "network range" (Dobrow & Higgins, 2005). An assessment of the relationships between the mentee and mentoring nodes may be that the relationships are characterized as either close or more distant, or as having strong or weak connections, all of which are depicted by different lengths and widths of the edges or ties connecting the nodes in the network model (Figure 3). Distance between nodes is determined by multiple factors, including emotional, professional, personal, or physical distance (Hetty van Emmerik, 2004). In addition, there may be nodes that are yet to be identified, or that are identified yet will be needed at different times based on the assessment of when a particular resource is needed. Such nodes may remain unconnected by an edge in a network at a given time point. Building stronger networks as needed occurs through initiating or strengthening connections of nodes to the mentee, and occasionally on reformulating or severing mentoring ties.

Are there relationships between nodes directly? An additional consideration is whether there may be connections between some of the mentoring nodes directly. The interconnectedness of a mentoring network can be described as "network density" (Dobrow & Higgins, p. 570). A low-density network consists of nodes that are largely independent, whereas a high-density network has nodes that have interrelationships or are well known to each other (Dobrow & Higgins, 2005; Uzzi & Dunlap, 2005). Occasionally facilitating connections between nodes or groups of nodes can enable synergistic mentoring outcomes (Uzzi & Dunlap, 2005). Such inter-network connections can also contribute to "access to a diverse array of skill sets" (Uzzi & Dunlap, 2005, p. 2). Notably, low-density networks have been associated with benefits to individuals in the early stages of exploring professional identity (Dobrow & Higgins, 2005). The degree to which network interconnectedness contributes or adds to a mentee's interaction with each mentoring node should be considered and cultivated, when helpful. Periodic assessment of relationships and current or developing needs may result in the addition or removal of nodes or movement in the position of nodes in the network.

Network Shuffle

Over the course of a goal or a career, a mentoring network has to be dynamic to accomplish maintaining the nodes and edges of the network in a topology that serves evolving career advancement needs. The management and reformation of one's network has been previously described as managing a "network shuffle" (Zambrana et al., 2015, p. 55) or network management (Uzzi & Dunlap, 2005). In the network shuffle, individuals identify a network of individuals with different, yet complementary, skills and/or resources to fulfill different mentoring needs and functions of the mentee (Long et al., 2014; Long et al., 2013; Zambrana et al., 2015). The inclusion of relevant nonhuman resources (such as books, Internet resources or courses, etc.) in networks has also been described as beneficial (Contractor, Monge, &

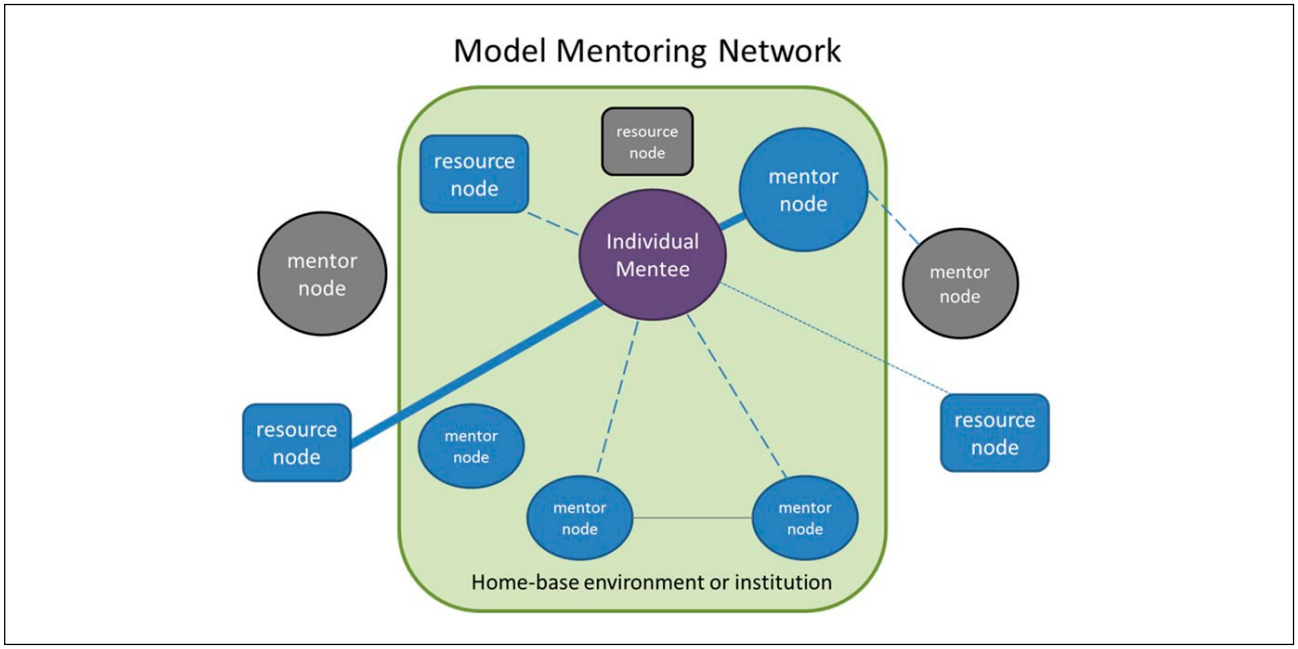

Figure 3. Mentoring network mapping model.
Note. Shown is an example of an egocentric or mentee-centered mentoring network including mentor (represented as circles) or nonhuman mentoring resources (represented as rectangles) nodes. Nonhuman resources include books, Internet resources, online courses, or other resources which provide insights into mentoring but are not direct relationships with another person. Blue nodes represent mentoring resources already known to the mentor, gray nodes are needed or unknown mentoring resources. The nodes are connected by ties or edges, which represent the relationships or interactions between mentee and mentor or engagement of mentee with a particular resource, with thinner dotted lines (weaker) to thicker solid lines (stronger) representing the strength of the relationship; and the length of the edges represent relative distance (professional, physical, or emotional). Nodes without edges are those that are identified as known nodes which will be needed at a later time or unknown or needed nodes that have not yet been identified and/or connected. The light green box represents the boundaries of the home-base environment or institution, whereas the space outside the box is external to one's home environment.

Leonardi, 2011; Long et al., 2013). Such networks are dynamic, and changes in an individual's network over time can prove beneficial to improving career or goal trajectories (Dobrow & Higgins, 2005). Indeed, a personal mentoring network should facilitate targeted, strategic, and effective movement along an individual roadmap. In this regard, a particular network model may be helpful for short-term planning, yet a different network may be more relevant or supportive for long-term planning. Thus, networks have to be evaluated periodically, particularly as related to current or short-term goals and long-term career trajectories. In this regard, Uzzi and Dunlap (2005) describe the need to periodically diagnose your network and then to reformulate and manage it to maintain a stronger supportive network in direct facilitation of individual needs, goals, and aspirations.

When and how to reposition nodes? Transitions in one's network may be critical for movement from one stage to another in one's career or course of study (Dobrow & Higgins, 2005; Grant, 2015). Mentoring has been described as effective in serving to "support in significant transitions" (Megginson et al., 2006, p. 5). This transitional mentoring (introduced above) likely will require the identification of new nodes (both in service to network diversity and network range) or shuffling of existing nodes, closer or farther away or through facilitating interconnections (to improve network density), as the need for engagement with a particular mentor or mentoring resource changes throughout the course of advancing along an individual roadmap. A concerted effort may be needed to strengthen edges between nodes already in an individual's network or to alter the distance of edges between nodes. Also, as described above, on occasion it becomes apparent that mentoring relationships are complete and, thus, nodes may need to be removed and/or replaced altogether.

Conclusion

The need for evidence-based tools for supporting career planning, development and strategic obtaining of the mentoring required to support these efforts are clear (Poodry, 2006; Valantine & Collins, 2015). Furthermore, there is a need for greater focus on the interpersonal processes involved in effective mentoring relationships (Hamlin & Sage, 2011). Here, career planning and reflection practices and knowledge about beneficial interpersonal exchanges are adapted to present tools helpful for supporting individual mentees in planning a mentoring roadmap and mapping a supportive, developmental mentoring network to guide individual advancement along a

personal roadmap. The tools described can also be engaged by mentors in planning for effective mentoring or facilitating co-planning or progress assessment with mentees. The partnering of the generation of a mentoring roadmap and construction of an individualized supportive mentoring network with other evidence-based tools, including participating in top-down or organizationally provided mentoring that may support understanding the framework for success in particular contexts, are anticipated to add strength to an individual's career planning and promote progressive outcomes. There are other ways in which integration of the models described here could be beneficial for a broad range of individuals from graduate students and academics to career professionals. One with great potential is integrated use of the network modeling process described here with other resources, such as an IDP (e.g., myIDP.sciencecareers.org, Clifford, 2002) for mentee self-assessment, mentoring websites (e.g., CienciaPR, www.cienciapr.org, Guerrero-Medina et al., 2013; MentorNet, http://www.mentornet.net/, Muller, Blake-Beard, Barsion, & Wotipka, 2012; MicroMenter, http://www.micromentor.org/; National Center for Faculty Development and Diversity, NCFDD, https://facultydiversity.site-ym.com/; National Research Mentoring Network, https://nrmnet.net/, R. McGee, Lee, et al., 2015), or emerging tools for mentor training (Byars-Winston et al., 2015; Pfund et al., 2014; Pfund, Maidl Pribbenow, Branchaw, Miller Lauffer, & Handelsman, 2006) and mentoring assessment (Tull, 2015). Overall, the model presented here is one integrated approach to assess a personal need for mentoring and to initiate a plan to obtain it in support of comprehensive career planning and strategic development.

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Pilot study of an intervention to increase cultural awareness in research mentoring: Implications for diversifying the scientific workforce

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Introduction. Innovative evidence-based interventions are needed to equip research mentors with skills to address cultural diversity within research mentoring relationships. A pilot study assessed initial outcomes of a culturally tailored effort to create and disseminate a novel intervention titled Culturally Aware Mentoring (CAM) for research mentors.

Intervention. Intervention development resulted in 4 products: a 6 hour CAM training curriculum, a facilitator guide, an online pretraining module, and metrics to evaluate the effectiveness of CAM training.

Method. Participants were 64 research mentors from 3 US research-intensive universities. Quantitative pretraining and posttraining evaluation survey data were collected.

Results. Participants found high value and satisfaction with the CAM training, reported gains in personal cultural awareness and cultural skills, and increased intentions and confidence to address cultural diversity in their mentoring.

Conclusions. Study findings indicate that the CAM training holds promise to build research mentors' capacity and confidence to engage directly with racial/ethnic topics in research mentoring relationships.

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Introduction

Evidence of racism and race-based prejudice and discrimination in the biomedical sciences and health professions would be easy to ignore, were they not so well documented [1, 2]. However, clinicians and scientists are reticent to acknowledge, and sometimes "color blind" to, the realities of race and history among their colleagues and trainees [3]. Despite some progress in the past several decades, a critical need remains for improvement in the training and experiences of individuals from historically underrepresented groups in the scientific workforce, including but not limited to Native Americans, African Americans, Hispanic/Latinos, and Hawaiians/Pacific Islanders [4]. The persistent racial disparities in professional attainments, including earned degrees and awards of federally funded R01 and other grants [5, 6], exposes the fact that race and ethnicity matter in biomedical and health science careers. Because it is only human to maintain the *status quo* [7], deliberate and proactive behaviors are required to counteract factors that contribute

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to the observed racial disparities in academic and career outcomes. One of those factors documented in the scientific literature is access to evidence-based mentorship [5], particularly mentorship that embraces and celebrates the cultural diversity within mentoring relationships.

There are increasing calls for evidence-based approaches to training [4] and other interventions to equip research mentors with skills and strategies to address cultural diversity and to not ignore the realities of racism in the biomedical and health sciences, particularly in mentored research experiences. In the helping professions including medicine, public health, counseling, and nursing, cultural competence has been proposed as a means to grow the capacity of providers to deliver culturally respectful care and to promote physical and mental health equity [8, 9]. Evidence supports the beneficial effects of cultural competence training on the attitudes and skills of health professionals [10]. Far less attention has been given to the likely equally important role of cultural "competence" in research mentoring. Good intentions and good will, although necessary, are not sufficient for tackling issues such as race, power, and privilege in mentoring relationships. As stated by Wear *et al.* [11], good intentions must be accompanied by the skills that can facilitate dialogue and address conflicts.

Unconscious bias trainings are proving to be critical catalysts in helping faculty to become self-reflective, and to recognize and address their personal biases in clinical and research sciences in academia [12, 13]. Although such trainings are important, they may be insufficient to provide a deeper understanding of how and why we are affected by race/ethnicity [1] and, more so, how to address and respond to racial/ethnic matters in the social interactions that occur in research mentoring relationships. Research mentoring relationships are the primary mechanisms for growing the next generation of scientists [4], and they are also the contexts in which cultural, social, and psychological factors that frustrate the engagement and persistence of emerging scientists from racial/ethnic groups historically underrepresented (HU) in the sciences occur, including feeling invisible, unvalued, incompetent, discriminated against, isolated, and marginalized [3, 14–17]. We assert that developing a deeper understanding of the ways in which race, racism, and privilege can contribute to the racial/ethnic disparities in academic and career outcomes should be an essential component of research mentor trainings and that such trainings need to provide mentors skills to navigate these dynamics. In this paper, we describe a cultural awareness intervention with skill-building components aimed at supporting research mentors' confidence to engage in and respond to sensitive topics related to race/ethnicity as they mentor diverse scholars, particularly those from HU groups. The intervention is delivered via a national initiative discussed in the following paragraph.

In response to the need for evidence-based approaches to training and mentoring of individuals in biomedical research career pathways, the National Institutes of Health (NIH) launched the National Research Mentoring Network (NRMN; www.nrmnet.net) in 2014. NRMN is a nationwide consortium of biomedical professionals and institutions collaborating to provide all trainees across the biomedical, behavioral, clinical, and social sciences with evidence-based mentorship and professional development programming. The goal of this NIH flagship initiative is to enhance the diversity of the NIH-funded research workforce. NRMN's program models emphasize the benefits and challenges of diversity, inclusivity, and culture within mentoring relationships, and more broadly the scientific workforce. Although critical training of emerging scientists occurs within research mentoring relationships, very little attention has been given to assisting research mentors who are predominantly White in developing the skills required to effectively mentor a more diverse population of women and scholars from HU racial/ethnic groups. Achieving mentoring effectiveness along these dimensions requires going far beyond traditional cultural competency to acquiring an understanding of how culture, race, ethnicity, and other social identities influence these often lifelong research mentoring relationships and actually practicing skills to respond to these factors. This paper reports on findings from a pilot study assessing the development process and initial outcomes of an intensive, multi-institution effort led by the NRMN Mentor Training Core to create and disseminate a novel intervention to teach Culturally Aware Mentoring (CAM) to research mentors.

Intervention Design

Process of CAM Curricular Development

The CAM team consisted of 8 scientists (6 women, 2 men; 5 White, 3 African American) from varying disciplines (biochemistry, community and public health, humanities, psychology), career stages (e.g., early career professionals, tenured professors, associate deans), and from 4 US universities. We had a range and decades of experiences designing, implementing, studying, and administratively coordinating professional development and training interventions for individuals in academia and in the private sector, including research mentors. We held teleconferences from December 2014 to December 2016 to conceptualize, develop, and test the CAM training. We referenced peer-reviewed research from the social sciences and education regarding theory and best practices on behavioral change and strategies for promoting cultural awareness. Four theoretical foundations were key in guiding our approach to the curriculum development and intervention design.

1. Multicultural and feminist theories, specifically the seminal scholarship by Sue *et al.* [18], Collins [19], and Anzaldúa [20]. These scholars asserted the importance of acknowledging all individuals as cultural beings (i.e., we all have culture, not just those from historically marginalized groups), the role of power and privilege in social interactions, and that individuals' contexts must be considered in order to understand and intervene on their behavior.
2. Critical race theory as articulated by Solorzano and Yosso [21] based on their studies of Latino/a students' persistence in higher education. This theory emphasizes the permanence of racism in US institutions and society, as well as the intersection between race and power. Solorzano and Yosso have investigated how the dominant culture undergirding predominantly White institutions can have an impact on the academic functioning and well-being on students from historically marginalized racial groups. Their work also documents the types of social capital such students have that allow them to be resilient in higher education, particularly at predominantly White institutions.
3. Transtheoretical model/motivation theory articulated by Prochaska and DiClemente [22]. Their seminal writings on smoking cessation articulated how behavioral change occurs across stages and identified several processes involved in behavioral change, including self-efficacy, decisional balance (i.e., weighing the pros and cons of new behaviors), and contingency planning for when new actions do not immediately result in desired outcomes.
4. Institutional transformation theories as captured in the National Science Foundation's ADVANCE initiative and investigated by Fox [23, 24]. This body of work addresses several facilitating factors needed for systems change toward creating equity in access to resources and professional opportunities that improve achievement and advancement outcomes for women in academic science, technology, engineering, mathematics, and medicine (STEMM).

Informed by assertions in these theoretical perspectives and frameworks, we defined *culturally aware mentoring* as mentoring practices in which mentors recognize their own culturally shaped beliefs, perceptions, and judgments and are cognizant of cultural differences and similarities between themselves and their mentees. Such mentoring requires that mentors (1) gain intrapersonal cultural awareness, (2) interpersonal cultural awareness, and (3) skills to recognize and respond to cultural diversity issues that may arise in their mentoring relationships. These 3 factors constitute the 3 elements of the CAM training intervention.

Stage 1: Training Conceptualization

We developed learning objectives, goals, and guiding principles for the training, building upon the CAM team's assessment of the theoretical and evidence base from the scholarship cited above. We articulated 4 learning objectives: (1) identify how your cultural beliefs, worldviews, and identities influence your mentoring practices; (2) recognize how cultural diversity can affect—complicate *and* benefit—your research mentoring relationships; (3) acknowledge the impact of conscious and unconscious assumptions, privilege, stereotype threat, and biases on the mentor-mentee relationship; and (4) apply evidence-based strategies using case studies to reduce and counteract the impact of biases, stereotype threat, and privilege to foster trusting, culturally responsive mentoring relationships.

Stage 2: Training Development

We developed activities aligned with the objectives and identified readings that could serve as reference material for participants. We solicited feedback on our training from a group of NRMN Master Facilitators, comprised of faculty and staff with advanced skill and experience in facilitating research mentor training. Their feedback guided our refinement of the CAM training content using an iterative cycle of creating or collecting, evaluating, revising, and finalizing key documents.

We based the CAM format on the research mentor training approach in *Entering Mentoring* [25, 26] that is well established and has been rigorously tested. The philosophy underlying *Entering Mentoring* emphasizes the development of mentoring principles, not specified mentoring practices, to guide participants discovering their own approaches for applying those principles to their practice. They do so by discussing common scenarios related to challenges in research mentoring relationships and then generating solutions to those challenges through group discussion. In the same vein, we approached development of CAM principles of practice based on research evidence to guide mentors in building their awareness of cultural diversity, especially racial/ethnic diversity awareness. Similar to *Entering Mentoring*, the CAM training rests upon a process-based approach, using case studies and group discussion about dynamics related to race and ethnicity to generate new insights related to CAM. We designed CAM training as a supplemental or advanced training for mentors who have participated in foundational research mentor training.

We used a face-to-face working meeting to (1) collectively review and discuss key multimedia material to incorporate into the training that could catalyze cultural awareness and rich discussion, (2) decide on sequencing of CAM curricular content, and (3) outline the CAM facilitation guide. The working meeting allowed us to experience the content and catalyzed several curricular decisions during and after the meeting. We decided to focus the CAM content specifically on race and ethnicity for 2 reasons. First, based on research, the hardest topic for most research mentors, especially White-identified mentors, to address is race/ethnicity, with some research mentors tending toward racial color-blind attitudes [27]. Second, we reasoned that if we can begin to address the challenges related to engaging with and addressing race/ethnicity in general and in our mentoring relationships in particular, then we can transfer those insights and learnings to addressing other aspects of cultural diversity such as those related to gender, socioeconomic status, mobility/ability status, and sexual orientation. We also decided to use a pretraining activity called the Culture Box to enhance participants' understanding of their personal cultural identities and ready them to discuss these identities in small groups at the onset of the training. This activity instructs participants to prepare a "Culture Box" before the training that includes artifacts (actual or pictures of the artifact) that relate to any of their cultural identities. We did not limit their cultural identities to their race or ethnicity, but allowed them to determine the identities that were most important to them to share during the training; this sharing also can include how these shared identities can have an impact on their mentoring relationships. After the working meeting, continued team discussions prompted us to add content summarizing the psychological research explaining the science underlying concepts such as implicit bias and stereotype threat, as they may be unfamiliar to some research mentors.

The activities in Stage 2 resulted in a 6-hour training focused on enhancing both intrapersonal and interpersonal cultural awareness and cultural skill acquisition toward being an effective research mentor. The training is typically scheduled from 9:00 AM to 4:00 PM (inclusive of a 1-h lunch break), is designed to be co-led by 2 facilitators, and consists of 3 sections. The "intrapersonal," or self-reflection, section (2 h) provides an orientation to the training and includes introductory activities and exercises to engage participants in personal reflections about racial and ethnic identity. The "interpersonal" section (1 h) provides examples and research findings of how cultural diversity factors may operate in research mentoring relationships and implications for being a culturally aware mentor. Participants review key terms and view videos related to cultural diversity and learn more about the research behind bias and stereotyping. The "skill-building" section (3 h) illustrates racial/ethnic issues via case studies, outlines CAM principles, and uses role plays to provide participants an opportunity to apply and practice the principles. The 3 sections in the CAM training and example activities are highlighted in Table 1.

Stage 3: Taking the Show on the Road: Pilot Testing and Iterative Revisions to the Training

Pilot testing took place in 2016 at several universities. In addition, activities from the CAM training were offered as part of conferences and professional development interventions for faculty and staff involved in research training. All implementations of the CAM training

Table 1. *Culturally Aware Mentoring (CAM) training areas of focus and example activities*

Areas of focus within training and description	Example activities
Part 1: intrapersonal/self-reflection (2 h): participants are introduced to the structure of the training, ground rules are established, and the group engages in several activities designed to encourage mentors to explore their cultural identity	• "Culture Box." Cultural identity activity (required homework) • Racial identity exercise • Self-reflection statements
Part 2: interpersonal (1 h): participants begin to explore how cultural identities affect interactions between mentors and mentees. Participants deepen their understanding of key terms and definitions introduced in the pre-session online module and discuss research on bias and stereotyping	• "A Tale of O: On Being Different." Video on cultural diversity in organizations • Key terms and definitions; exploring the science behind assumptions
Part 3: skill-building (3 h): Participants are introduced to strategies for culturally aware mentoring and are encouraged to build and practice skills through several case study and role-playing exercises	• Case studies • Role play • Principles and resources for culturally aware mentoring

were delivered by CAM team members in pairs of cofacilitators. We were purposeful in pairing cofacilitators who varied across demographics, including career stage, gender, disciplinary training, and racial/ethnic identities. We did this to provide participants with the opportunity to hear different perspectives and voices throughout the training, so that no facilitator felt like they had to be the authoritative voice on a particular topic. In this paper, we report on implementation of the full, 6-hour CAM training that occurred at 3 separate sites. The sites were affiliated with the NIH-funded Diversity Program Consortium, which includes the BUILD program (www.nigms.nih.gov/training/dpc/Pages/build.aspx) and NRMN. These initiatives have as their goal to diversify the research workforce by engaging and retaining trainees from diverse backgrounds in biomedical research, and by supporting diversity at student, faculty, and institutional levels through innovative approaches to research skill-building and training and mentorship. Each of the 3 sites initiated contact with the CAM team after learning about the training opportunity through NRMN and agreed to participate in the pilot testing of the CAM intervention. We took an iterative approach to our curricular design, informed by formative evaluation feedback collected through our surveys and conversations with training participants and facilitators across implementations. Next, we describe the implementations and subsequent changes that we made to the CAM curriculum based on participant and facilitator feedback.

Implementation 1 (n = 14) occurred at a private historically Black university in a Southern US state (Winter 2016). A Black female social scientist employed as a research scientist and a White male basic scientist employed as a tenured professor and senior administrator served as the cofacilitators. Both facilitators had experience delivering professional development trainings to faculty and students, with active research programs investigating cultural diversity factors in the career development of HU racial/ethnic groups in the research sciences. On the basis of feedback from the participants and facilitators in Implementation 1, we added time for silent, self-reflection during brief moments throughout the training for participants to write any personal reactions, insights, or questions that emerged. We also incorporated brief descriptions of theoretical paradigms and concepts including White fragility [28] and systems-level thinking [24]. We implemented the revised training at 2 additional sites.

Implementation 2 (n = 26) occurred at a large public university in a Western US state (Spring 2016). The same White male basic scientist from Implementation 1 along with a Black female social scientist served as the facilitators. Both were senior tenured professors. The social scientist was a trained therapist and researcher with extensive experience in designing and developing culturally relevant mentor training interventions, and an active research program—similar to the cofacilitator basic scientist—investigating academic and career development of HU racial/ethnic groups in the research sciences. Feedback from Implementation 2 included requests for additional time dedicated to skill-building, inclusion of more research findings and resources related to cultural diversity factors in research training, and definitions of cultural diversity terms (e.g., stereotype threat). As a result, we refined our case studies and devoted more time for participants to practice the CAM principles before the third implementation.

Before the third pilot, the CAM team decided to create a pretraining module delivered online for participants designed to be completed within a week before a scheduled training. This pretraining module offloaded some of the time allotted during the training to cover foundational content, such as definitions of key terms and research on the relevance of race, ethnicity, and other dimensions of cultural diversity to research training. To create the online module, the CAM team curated extant articles and videos, and then created original narrative content to integrate the curated material into a coherent presentation. The goal of this online module is to serve as a primer for the training by increasing participants' understanding of how cultural diversity issues are relevant to research trainees' development, academic outcomes, and success. This online pretraining module addresses 4 topics: (1) race and privilege, (2) the experiences of scientists from historically underrepresented groups, (3) the realities of cultural diversity in the sciences, and (4) the role of CAM in trainee outcomes. Each section concludes with self-reflection questions and provides a "Go Deeper" set of relevant readings (e.g., New Yorker article, "The Origins of Privilege" [29]) and video clips (e.g., PBS series, "Race: The Power of an Illusion" [30]) for additional learning should participants choose. The online module is self-directed and takes about 1 hour to complete. This pretraining content allowed more time during the CAM training for participants to spend in skill-building. The online module was tested with 30 NRMN Master Facilitators from a range of disciplinary backgrounds and career stages who provided formative feedback on the module before its use with the final pilot-testing site.

Implementation 3 occurred at a graduate-serving institution in a Western US state (Fall 2016). The White male basic scientist from Implementations 1 and 2, the Black female social scientist from Implementation 2, and a White woman health scientist served as the facilitators. The health scientist was a senior tenured professor with extensive national leadership in developing and designing training programs for HU racial/ethnic groups and an active research program in health disparities. Participants (n = 30) were part of a statewide advisory group on mentoring in academic STEMM departments and training programs and represented several colleges and universities. Formative evaluation from this pilot test resulted in additional minor edits and modifications to the curriculum (e.g., refining transitions between CAM sections, refining instructions for role plays in the case studies). Data for all 3 sites were examined to assess the value of this training and participants' self-reported skill gains relative to CAM.

Method

Participants

A total of 70 mentors participated in the training across 3 implementations; 64 mentors (91%) provided consent for their data to be included in this research across the 3 pilot test implementations. Prior mentoring experience and demographic information for participants at each implementation site are provided in Table 2.

Data Sources

Data were collected from mentors via surveys that were administered before and immediately after the training. Pretraining and posttraining data were collected via Qualtrics, an online survey administration tool. For this paper, we focus on data collected in the posttraining survey. Questions were selected from a library of metrics being used across NRMN [31] as part of their ongoing evaluation efforts. We augmented NRMN evaluation questions by including additional items that assessed the extent to which participants perceived gains in their cultural awareness and CAM skills.

Perceived Value of Training

We evaluated the value of the training to participants by assessing their likelihood to recommend the training to other mentors, by their ratings of the training facilitators, and by the perceived value of each activity implemented during each training. Specifically, mentors were asked "How likely are you to recommend this training to other mentors?" Response options ranged from 1 (*very unlikely*) to 5 (*very likely*). Mentors were asked to rate each facilitator as either *excellent, good, fair,* or *poor.* Finally, mentors in Implementations 2 and 3 were asked to rate how effective each topic or activity was in helping them to become a more culturally aware mentor; response options ranged from 1 (*very ineffective*) to 5 (*very effective*).

Table 2. *Summary of demographic information and prior mentoring experiences of participants*

	Implementation 1 (n = 12)	Implementation 2 (n = 26)	Implementation 3 (n = 28)
Race/ethnicity of participants [n (%)]*			
American Indian/Alaskan Native	–	1 (4%)	–
Asian	1 (8%)	6 (26%)	2 (7%)
Black/African American	4 (31%)	1 (4%)	7 (25%)
Native Hawaiian/Pacific Islander	–	–	–
White	7 (54%)	13 (57%)	16 (57%)
Other	–	–	1 (4%)
Hispanic/Latino(a)	–	5 (22%)	4 (14%)
Not reported	–	1 (4.3%)	1 (4%)
Gender of participants [n (%)]*			
Male	4 (31%)	7 (30%)	7 (25%)
Female	8 (62%)	16 (70%)	20 (71%)
Not reported	1 (8%)	–	1 (4%)
Primary mentor to a student researcher [n (%)]	9 (75%)	22 (85%)	15 (52%)
Years of experience as a research mentor [mean (SD)]	14.22 (9.07)	11.55 (8.94)	14.64 (9.51)
Participated in prior mentor training [n (%)]	6 (50%)	19 (73%)	9 (31%)
Career stage of mentees [n (%)]*			
Junior faculty	1 (8%)	8 (31%)	15 (52%)
Postdoctoral fellows	1 (8%)	–	10 (35%)
K awardees	–	–	3 (10%)
T awardees	–	1 (4%)	3 (10%)
Clinical fellows	–	–	7 (24%)
Ph.D. or Master's students	–	17 (65%)	15 (52%)
Medical/Healthcare Professional Students	1 (8%)	2 (8%)	11 (38%)
Undergraduates	9 (75%)	19 (73%)	10 (35%)
High school students	–	1 (4%)	1 (3%)

* Participants were invited to check as many categories as applied to them. As a result, column totals may add up to over 100%.

Perceived Gains in Skill

At the conclusion of the training, mentors retrospectively rated their level of skill before and after the training in several areas related to CAM. Four skill areas, which were assessed consistently across the 3 implementations presented in this paper, are reported in the results. Included in the survey was space for open-ended responses, in which participants provided additional comments about their experience.

Analyses

All descriptive statistics and statistical tests of significance were calculated using IBM SPSS Statistics version 23. To examine *training satisfaction*, we calculated the percentage of mentors' likelihood of recommending the CAM training to other mentors across each implementation. We then calculated mentors' median rating of the training facilitators in each implementation. Next, we examined the average rating of the efficacy of activities in helping participants to become a more culturally aware mentor to determine the top 3 activities across each implementation.

Dependent samples *t*-tests were conducted for each of the 4 *skill gain* items to examine whether significant changes in perceived skill gains emerged. In addition to examining *p* values to determine statistical significance, we also examined practical significance using the effect size d_z, which is a measure of the effect size of the standardized mean difference, $d_z = \frac{t}{\sqrt{n}}$ [15].

Qualitative Interviews 18–24 Months Post Intervention

To begin understanding the long-term utility and influences of the CAM intervention, participants are being contacted 18–24 months after the training. A semi-structured interview protocol was used for phone interviews with willing participants. Interviews were conducted by 3 members of the CAM team who did NOT participate in the training at that site. All of those who did the interviews are highly experienced qualitative researchers. Phone interviews were audio-recorded and transcribed professionally for content analysis. For this pilot study, initial analyses are focused only on examples of changes in thinking and behavior, not attempting to relate to analytic framework or theory.

Results

Perceived Value of Training

The majority of participants were either likely or very likely to recommend the training to other mentors across Implementations 1 (n = 11, 85%), 2 (n = 23, 100%), and 3 (n = 24, 85%) and rated the CAM facilitators highly (data not shown). As summarized in Table 3, the activities rated as most effective for helping mentors to become more culturally aware for Implementations 2 and 3 were "A Tale of O," a video on cultural diversity in organizations, a case study and role play activity titled "Trainee Differences," and the Culture Box. Our observations as facilitators were consistent with mentors' high ratings of the Culture Box, as it was effective in getting mentors to open up quickly in sharing and reflecting on cultural diversity. This activity elicited strong emotions and authentic exchanges among participants, and it was not uncommon for individuals to be visibly moved or emotive while sharing their Culture Box content. It is the training activity that was the hardest to conclude, as mentors were highly engaged in respectfully displaying their cultural selves, many doing so for the first time. Two mentors from Implementation 2 noted that the Culture Box was "*helpful to break the ice and build an open conversation*" and "*allowed me to know my colleague's story*." Several noted the irony between how much they learned about colleagues in the room in

Table 3. *Activities rated as most effective* for helping mentors become more culturally aware*

	Implementation 2 [mean (SD)]	Implementation 3 [mean (SD)]
A Tale of O: video on cultural diversity in organizations	4.39 (0.58)	4.67 (0.56)
Culture Box: cultural identity activity	4.38 (0.50)	4.79 (0.42)
Case study and role-play activity: trainee differences	4.27 (0.77)	4.68 (0.73)
Case study: family ties	4.23 (0.61)	4.54 (0.51)
Principles for culturally aware mentoring	4.13 (0.62)	4.62 (0.57)
Research on cultural diversity dynamics	4.00 (0.76)	4.32 (0.72)
Discussion of *Nature* article, "Building a Future Scientist"	4.00 (0.69)	4.00 (0.85)
"The one thing you can do"	3.94 (0.57)	–†
Definition and discussion of key terms	3.86 (0.64)	3.81 (0.75)
Racial/ethnic identity exercise	3.83 (0.71)	4.57 (0.57)
Self-reflection exercises	3.63 (0.76)	–†

* Responses could range from 1 (*very ineffective*) to 5 (*very effective*).
† This activity was not included in Implementation 3.

30 minutes through this activity in contrast to how little they know about their trainees they work with every week and for several years.

Open-ended responses from participating mentors reflected the overall utility of the training. Some mentors commented on their own revelations regarding the importance of addressing cultural diversity in the research mentoring relationship. One mentor from Implementation 1 noted: "*This topic is important and worth the time it takes in meeting (e.g., building in time in meeting for discussion). It [culturally aware mentoring] is my ethical responsibility if I am going to be a mentor. Loved talking to my peers about this!*" Another mentor from Implementation 3 shared that "*I hadn't thought about how these practices were important in inviting productivity in a lab.*" A mentor from Implementation 2 expressed appreciation for the research findings shared in the training: "*I will continue to advocate for my students and thanks to you I have research to support what I have [experienced].*"

Perceived Skill Gains

The average perceived skill level as retrospectively assessed by mentors in all 3 implementations is reported in Table 4. Significant skill gains were reported across all 4 skills as a result of attending the CAM training. The largest mean differences reported by mentors were detected for the skill "*Intentionally creating opportunities for my mentees to bring up issues of race/ethnicity when they arise.*" This large skill gain observed relative to intentions was mirrored in mentors' responses to a question on how they intend to apply what they have learned in the CAM training. Many gave concrete examples of how they would mentor differently in the future. One example of such transformational plans to address issues of race/ethnicity came from a mentor who participated in Implementation 2: "*I'll be more likely to bring up race/ethnic cultural issues as opposed to being open to them being discussed.*" This mentor's intention reflects a shift from placing responsibility on the mentee to bring up discussions of race and ethnicity to being more intentional in initiating such discussions.

Importantly, both from observation and evaluation data, our approach to facilitating mentors' critical self-reflection on who they are as cultural beings increases their understanding of the relevance of race and ethnicity in their research mentoring relationships. The findings

Table 4. *Perceived culturally aware mentoring skill gains* as reported by mentors at the conclusion of the training*

	Implementation 1 (n = 13)					Implementation 2 (n = 23)					Implementation 3 (n = 27)				
	Before [mean (SD)]	Now [mean (SD)]	M_{diff}†	*p*	d_z	Before [mean (SD)]	Now [mean (SD)]	M_{diff}†	*p*	d_z	Before [mean (SD)]	Now [mean (SD)]	M_{diff}†	*p*	d_z
Intentionally creating opportunities for my mentees to bring up issues of race/ethnicity when they arise	4.38 (1.50)	5.62 (1.12)	1.23	0.004	1.00	3.70 (1.11)	5.26 (1.05)	1.57	<0.001	1.58	3.85 (1.51)	5.70 (0.82)	1.85	<0.001	1.50
Encouraging mentees to think about how the research relates to their own lived experience	5.00 (1.35)	5.77 (0.93)	0.77	0.006	0.92	4.39 (1.03)	5.52 (0.79)	1.13	<0.001	1.63	4.26 (1.48)	5.52 (1.22)	1.26	<0.001	1.15
Going outside of my comfort zone to help mentees feel included in the lab	4.62 (1.39)	5.62 (1.26)	1.00	0.006	0.93	4.35 (0.98)	5.70 (0.82)	1.35	<0.001	1.37	4.56 (1.56)	5.72 (1.17)	1.16	<0.001	1.29
Respectfully broaching the topic of race/ethnicity in my mentoring relationships	4.62 (1.71)	5.54 (1.27)	0.92	0.011	0.83	3.83 (1.03)	5.43 (0.84)	1.61	<0.001	1.92	4.19 (1.33)	5.63 (1.01)	1.44	<0.001	1.33

* Mentors were asked "Please rate how skilled you feel you were BEFORE the training and how skilled you feel you are NOW in each of the following items." Responses could range from 1 (*not at all skilled*) to 7 (*extremely skilled*).
† M_{diff} represents the mean difference between mentors' self-reported level of skill thinking back to before the training as opposed to now, after the training.

also suggest that our training is effective in increasing participants' perceived cultural skills. Finally, the day-long commitment (7 h inclusive of lunch break) did not appear to be a deterrent to participation and may be reflective of institutional commitment and faculty demand for more support. As one mentor from Implementation 2 wrote in the evaluation, "*This type of training is doable! (I doubted it before).*"

Value of CAM Pretraining Online Module

In Implementation 3, 29 of the 30 participants (97%) completed the CAM pretraining online module. Most completed the module in 60–90 minutes (n = 11) or 30–60 minutes (n = 9), with a few spending either 90 minutes–2 hours (n = 5) or more than 2 hours (n = 4). Participants reported being familiar with the module topics before completing it [median = 4 on a 5 point scale ranging from 1 (not at all familiar) to 5 (extremely familiar)], yet still rated the module components as highly valuable in preparing them to participate in the CAM training. On a 5-point scale (1 = not valuable, 5 = extremely valuable), the highest-rated module component was the videos (mean = 4.73). One participant stated, "*I watched some videos 2xs, because so much info.*" Overall participant feedback and comments were favorable.

- Excellent—this was FASCINATING (original emphasis), educational, insightful, and really prepared ("primed") us for discussion
- I feel the length was really ideal
- I learned the most from watching the entire hour-long piece "White like me." I appreciated the historical perspective
- I liked that you could spend more or less time on each item
- More issues around gender difference
- Videos were very helpful, enjoyed having references available.

Impacts of CAM on Participants Thinking and Actions After the Training

To determine the impacts or influences of the CAM intervention over time, an extensive interview-based qualitative study is underway. We invited participants to take part in an ~30-minute semi-structured interview with one of the CAM team members who did NOT lead the training at their site. Although this study is ongoing and will be the subject of future reports, some early insights into the types of impacts of CAM are emerging. Virtually all of the participants interviewed to date could easily identify some examples of lasting changes in their self-reflections and behaviors as a result of CAM. The themes identified from even these first analyses are summarized in Table 5.

Table 5. *Impacts and influences of CAM from interviews 24 months after training*

Greater realization of their own racial and ethnic biases and insensitivities
More comfort and proactivity talking with students about the importance of considering culture when engaging other people
Creating better communication within a research team—more listening of people's different experiences definitely than before
Better engagement with historically underrepresented (HU) students, even by HU faculty
More awareness of how personal experiences vary and can influence behavior and performance, getting more information before jumping to conclusions
More awareness of how economic situations affect students
In one-to-one mentoring, checking in more on personal situations of students
Opening up to sharing more of himself so students can see how he is balancing work and life
More open-minded and seeking more information about how personal circumstances and factors can affect academic and research performance
Increased attention to help students problem-solve if they come from more difficult situations
More individualized mentoring strategies
More likely and confident to speak out when encountering false statement and biases related to experiences of diverse students
More comfortable in her own research that deals with racial/ethnic differences and health behaviors
More attuned to how choice of language in data interpretation and presentation in papers can be unintentionally negative toward specific groups
More comfortable having conversations with graduate students about language in writing

Discussion

Colón Ramos and Quiñones-Hinojosa [3] asserted that although "we aspire to have a diverse biomedical workforce, conversations about why we lack diversity are frequently left to minority researchers." Not only are conversations regarding persistent underrepresentation of specific racial/ethnic groups viewed by some as "not my problem or issue" [1], but conversations related to race, racism, and bias are viewed as irrelevant to research training and mentorship. These views are exacerbated by the fact that in the United States we are socialized to fear cultural diversity topics, especially those related to race and ethnicity [32]. It is no wonder that there are few places in academia where research mentors can have frank discussions about race, racism, and the legacy of these dynamics on our institutions and in the biomedical workforce [3]. The CAM training achieved the goal of initiating open, honest conversations about race, privilege, discrimination, unconscious bias, and the lived experiences of HU groups in the sciences. Moreover, the CAM training shows promise as an intervention to build research mentors' capacity to engage directly with racial and ethnic topics in their research mentoring relationships.

Notably, mentors who participated in the CAM training reported significant skill gains not only in their intentionality to address race/ethnicity, but increased openness to broach racial, ethnic, and cultural topics in their research mentoring relationships and willingness to go outside of their comfort zone. Our evaluation data indicate that this increased openness to broaching was true even for faculty who were themselves from HU groups. The skills to enact culturally aware principles in research mentoring relationships are predicated upon the notion of racial stamina [28]. Racial stamina requires a willingness to mentally "hang in" through the discomfort often inherent in diversity dialogues, resisting the urge to divert, dismiss, or downplay race and ethnicity, and instead directly engage with these topics. Although DiAngelo [28] discussed racial stamina largely in the context of White majority individuals, who she identified as needing to increase their tolerance for racial stress in cross-racial dialogues, it is relevant across racial/ethnic groups. One reason that low racial stamina may occur is that individuals lack the strategies for navigating difficult dialogues. The increases that we observed in mentors' perceived skill gains in enacting CAM principles suggest that the CAM training may support mentors' racial stamina by providing them with evidence-based skills to facilitate addressing racial/ethnic dynamics in their mentoring relationships, including validating their trainees' racial/ethnic and academic identities and discussing sensitive racial/ethnic topics.

In addition to the overall perception of training value expressed by mentors, the Culture Box activity was viewed as both useful within the context of the training and a tool that could be used in the context of their research mentoring relationships. Several mentors stated their intention to implement the Culture Box activity with their mentees or research groups. Others noted the utility of this activity as a tool for continued professional development with research mentors: "*I plan to take specific literature resources and activities such as the Cultural Box and videos and directly place them into the context of mentor development*" (mentor from Implementation 3). It was noteworthy how powerful the Culture Box activity was in quickly opening mentors up to exploring and sharing their personal cultural backgrounds with one another. As participants explore their personal cultural identities, it is impossible to anticipate the breadth and depth of content that they choose to share and their reactions to what is shared. Facilitators of CAM, therefore, must be especially nimble and alert to reading the emotional tenor of participants, gauging how to bring the activity to conclusion in a way

that honors participants and what they disclose. Importantly, the Culture Box activity comes early in the CAM training just after ground rules are discussed, and sets the tone for the entire training thereafter, signaling to the participants an invitation to engage in authentic ways. The fact that this is the first activity is significant for 2 reasons.

First, what becomes quickly evident in the activity's discussion is a pattern of which mentors' bring artifacts that describe their racial/ethnic identity Versus other dimensions of cultural identity (e.g., gender, sexual orientation, physical mobility status, religious tradition). This observed pattern provides facilitators the opportunity to highlight the particular dynamics of being a member of a visible cultural group (e.g., racial/ethnic group) Versus a less visible cultural group (e.g., religious tradition). This pattern also highlights how we are socialized in the United States to view each other in terms of racial/ethnic group membership yet simultaneously avoid talking about race/ethnicity, and invites participants to consider the consequences of that avoidance in our everyday lives in general and in the research mentoring in particular. Second, the Culture Box activity emphasizes from the onset that we all have cultural identities. Mentors are subsequently encouraged throughout the remainder of the CAM training to consider cultural diversity, race/ethnicity in particular, in their mentoring relationships not from just their mentees' vantage point but also from the vantage point of how their own cultural identities play out in the relationships. On several occasions, we were surprised to have observed participants self-disclose physical disability status, unresolved traumatic experiences, and racial/ethnic backgrounds not evident from phenotypic appearance with other members of their small group. These reflections were shared as potential sources of vulnerability that helped participants gain a degree of empathy with the lived experience of HU racial/ethnic groups. For these reasons, we chose to keep the instructions general for the Culture Box.

A sizeable percentage of participants, but not all, in the CAM pilot study had prior research mentor training. Although the CAM training may be useful to research mentors regardless of prior training, our experience with CAM training indicates that those with foundational knowledge of research mentoring principles may be better prepared to incorporate CAM content into their mentoring practices.

Finally, given that the training is nearly a full workday in length, one might expect that participants would experience exhaustion cognitively, emotionally, and physically. We did not specifically assess participant engagement or energy levels throughout the training. On the basis of facilitators' observations, participants were experientially saturated at the conclusion of the training. Some participants reported on their evaluations that the training could be shorter (e.g., "*Doesn't need to be 6 h long*"). Others reported to facilitators and on their evaluations that they would have welcomed more time, perhaps spread across 1.5 days with time in between to process new insights (e.g., "*More time to reflect before discussion and more case studies; allow more time for introspection and journaling*"; "*More time for discussion [is there ever enough time?]*").

Future Directions

Next steps for the CAM team include continued evaluation of the impact of the CAM training on participants. This evaluation will include follow-up (6 months, 1–2 years later) with the implementation sites in the pilot-testing phase to investigate how participation in the CAM training affects the longer-term attitudes, beliefs, and actual behaviors of mentors. Indeed, one significant measure of success will be the persistence of CAM training effects on both mentors' behavioral changes and the academic and career outcomes of the trainees they mentor. Extensive research based on the theory of planned behavior, widely tested in health behavior models, demonstrates that intentions are the most important determinants of people's eventual behavior [33]. A recent systematic review investigating empirical studies predicting self-care intentions and behaviors in individuals at risk of diabetes revealed that intention was the most predictive construct of self-care behaviors [34]. As reported in the Results section, our initial findings from follow-up interviews indicate that participants are subsequently making changes in their mentoring behaviors and related beliefs. Further evaluation will also allow us to examine what aspects of the CAM training mentors attribute to their skill gains.

In addition, the CAM team has recently trained more expert facilitators to lead CAM trainings, and they will be leading them in universities around the United States over the next 12–24 months. Although the basic design of the CAM session will remain constant, the pilot testing has revealed a need to adapt it slightly to the unique context of each site. Those adaptations will be documented, as will systematic feedback and observations of the cofacilitators after each training. Thus, we will continue to study not only the short-term and long-term influences of CAM on participants but also how it is best delivered as an intervention in a variety of different academic contexts.

Limitations

The CAM training currently focuses on the demographic diversity variables of race/ethnicity. Although a significant number of participants self-identified as White, some mentors were from HU racial/ethnic groups. We also note that a majority of participants in our samples were women. Participants' gender intersecting with race and ethnicity might be an important interactional effect to be investigated and addressed in future CAM trainings, including the effectiveness of the race/ethnicity-focused CAM training with greater numbers of male participants from racially/ethnically diverse backgrounds. The self-report nature of our evaluation data carries the limitations commonly identified with these data, including the question of to what extent participants' behavioral intentions to practice culturally aware principles in their mentoring translate to actual behaviors. Thus, we caution the extrapolation of our findings based on our pilot test results and hope that these initial findings spark continued research on interventions to prepare mentors to be more effective with trainees who are different from themselves in any cultural dimension, toward the larger goal of advancing scientific workforce diversity.

Conclusion

The CAM training is a novel culturally tailored curricular intervention for research mentors and has great promise to go beyond the surface and open deep self-reflective dialogue about race/ethnicity in science, research training, and academic medicine for which NIH leaders have been calling. Further, whereas cultural diversity trainings often raise participants' awareness of personal and interpersonal cultural factors, the CAM training goes a step further and provides mentors with the opportunity to practice enacting CAM-related skills. The combined efforts of our CAM team have resulted in 4 products: a 6-hour training curriculum, a facilitator guide, an online pretraining module, and metrics to evaluate the efficacy of this training. Buoyed by the NRMN, we intend to make the training more broadly available and have begun training more facilitators to lead its continued implementation nationwide. The training is complex to lead as it rapidly opens up challenging conversations that facilitators must be prepared to guide, requiring solid skills in group dynamics and an ability to navigate cultural diversity factors that subtly and overtly emerge from and between participants. The training is not sufficient to change the face of science and research by itself. However, our evaluation data from this pilot study indicate that the CAM training is able to facilitate research mentors' awareness of, intention to, and confidence in attending to racial and ethnic matters that must be addressed as we work toward equity and inclusion in diversifying science.

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Disclosures

The authors have no conflicts of interest to declare.

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LETTERS

Edited by **Jennifer Sills**

Beyond hierarchical one-on-one mentoring

The NextGen Voices section "Quality mentoring" (5 October, p. 22) demonstrates how traditional hierarchical mentoring relationships, when they work, can be sources of incredible psychosocial and practical support. However, when these relationships are not strong, they can hinder or even harm mentees (*1*, *2*). The unequal power dynamic of a senior mentor (typically one who is male and white) and junior mentee can be especially problematic for individuals belonging to systematically marginalized identity groups (such as women, people of color, and individuals with disabilities) and can exacerbate a sense of isolation for the mentee (*3*). Furthermore, mentees, more than mentors, say that mentoring relationships should directly address cultural diversity (*4*). A mentoring network, including peer mentoring, can address the shortfalls of traditional one-on-one mentoring.

A mentoring network with multiple modes of mentoring (*5*) dismantles the guru mentor myth, which suggests that one senior mentor is a necessary and sufficient source of mentoring. Instead, a mentoring network framework centers on the mentees and what they need and desire to thrive in their career; it then meets their varied needs through a host of mentoring relationships (*6*, *7*). Peer mentoring can serve as an important node in an individual's broader mentoring network and reduce the reliance on hierarchical relationships (*8*).

Peer mentoring is a truly horizontal mentoring experience (*9*) that offers participants access to resources, support, and accountability in a regular group meeting setting. Evidence suggests that peer mentoring is most effective with groups of five to eight participants who are all at a similar career stage, have complementary fields of expertise, and share social identities (such as gender, race, ethnicity, or ability status) (*10*). There is no senior mentor, and thus the model asserts that each peer mentoring participant has useful wisdom and perspectives to share as well as areas in which they need advice. Peer mentoring provides an opportunity to collaboratively problem solve, share ideas and perspectives, and develop community and thus serves as a mechanism for developing independence and career self-efficacy (*11*).

Peer mentoring becomes especially important as mentees mature and develop into independent scientists. Through peer mentoring, individuals participate in reciprocal and interactive relationships in which they have the opportunity to develop not only their own problem-solving skills and career self-efficacy but also their confidence and skills as mentors. Peer mentoring can be a component of a professional development program (*12*) or a stand-alone activity (*10*). Those looking for the mentoring so valued by contributors to the NextGen Voices survey might consider giving peer mentoring a try.

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